PENNSYLVANIA
COAL REGIONS.

622
B

RY

THE "RECIPROCITY" COAL INTEREST.—Instead of the new reciprocity treaty with Canada bringing coal to compete with our native coal to an injurious extent, it will enable us to export our coal largely to the Canadas. With the duty there was shipped from Oswego in 1852, 4,232 tons; in 1853, 5.847 tons, and in 1854, 10,879 tons—total, 20,958 tons, as the custom-house statistics of Oswego show. The treasury returns show that there was a total export to Canada in 1854 of 30,275 tons. This export will be greatly increased now, especially of anthracite coal.

For the Journal of Commerce.

MARYLAND COAL vs. WOOD IN LOCOMOTIVE ENGINES.

The Railroad Advocate of Saturday, March 3d, has the following item:—

"The Engines of the Philadelphia and Baltimore Road, 35 in number, ran during the year ending November 30, 1854—518,772 miles. These engines are mostly eight wheeled, with four drivers, and generally from 13 to 17 inch cylinders. They burned 16,889 cords of wood, equal to 3¼ cords per 100 miles, or 30 8-10 miles per cord burned. The average cost of wood was $4 per cord, and the expense of handling, preparing, and loading tenders, 65 cents per cord, or $4,65 per cord in all. The total cost of wood was $78,533 85, equal to 15 1-10 cents per mile run."

It is a well known and established fact, that one ton of the BEST Maryland coal is equivalent in steam generating power to two cords of the best *wood*. This coal cost in Baltimore $4 per ton of 2,240 lbs—and it is to be seen at a glance that if, on the engines of the Road in question, *coal* could be at once substituted for wood—the cost of running them would be reduced to less than seven cents per mile run—or are aggregate saving in the cost of fuel be effected of over $40,000 per annum. It is true that for passenger engines adapted to wood, some alterations to the fire boxes and exhaust arrangements would be required—and the usual objection offered by railroad companies to making the change, is, that it will cost TOO MUCH to make these alterations. The insufficiency of this argument is too glaring, in view of the results above mentioned. It would be infinitely better, for instance, for the Philadelphia and Baltimore Railroad Company to expend on their 35 engines the whole $40,000, and make the alterations required. It is, however, quite certain that nearly all wood burning engines can be altered to burn coal, at a cost not exceeding $500 per engine. But passing over the expediency of altering the present wood burning engines, no railroad company should contemplate increasing their stock of engines without insisting that they should be *coal burners*. Machinists are already turning their attention to these engines, and among them many who have had experience in overcoming former objections; the problem is solved, and it only is requisite that the Directors of Railroad Companies should awaken to their true interest and determine that the present costly and extravagant locomotive fuel shall be abandoned—it is growing more burthensome every day, while the increased production of coal is tending to diminish its cost. The Baltimore and Ohio Railroad use coal and coke in at least three-fourths of the 210 engines employed on their road—and it is to the cheapness of this fuel they are indebted for the ability to compete with other roads in the transportation of merchandise and passengers.

It may be truly said that coal has reduced the grade, levelled the mountains, straightened the curves, and shortened their line—for coal has enabled them to transport 400 miles at a cost which other roads using wood as a fuel will exceed in 200. Let our Northern roads awaken from their lethargy—*it is the greedy* wood-burning locomotive that is running away with their earnings and keeping back dividends.

Since writing the above, we learn that the Taunton and New Bedford Railroad Company have an engine which is burning the *Maryland Coal*, at a cost of 8 cents per mile run with passenger trains—and that the coal costs them $7,50 per ton, delivered on the road. We regard this experiment as the begining of the *end*. The way is broken—who'll follow?

The legislature of Virginia have lately incorporated the "Dora Coal and Iron Manufacturing Company, with a capital of $1,000,000, for the purpose of working one of the richest mineral regions which exist in that state, if not in the country. The lands of the corporation cover fifteen thousand acres, located mostly in Augusta county, 135 miles southwest of Washington, D. C. The Virginia Central Railroad, from Richmond, passes in close proximity, Stanton station being 18 miles distant. The Manassas Gap Railroad will pass still nearer—within ten miles. The latter road is already graded to Strasburgh. We have good authority for stating that the mineral resources of this region are truly unparalled. The deposits exist in an extensive range of hills, and crop out at the surface and sides for miles together.

At one locality near the centre there is a large basin of some six miles diameter, formed by a break in the hills. In these cliffs the veins are exposed to view to an astonishing extent, while the approach to them is so easy that carts can drive up and have loads of the finest quality of coal dumped in from the veins overhead.

The company intend to construct a railroad to intersect the Virginia Central and the Manassas Gap. The surface of the country is quite level, even up to the very veins themselves, so that the cost of the road and transportation will be comparatively small. When this juncture is completed, they will be in communication with Richmond, Alexandria and Washington, all very extensive coal markets, delivering their coal at those places for two dollars per ton, mining and freight included.

The average of price there, by the cargo, is $4 50, which leaves a net profit of about one hundred and thirty-three per cent. For $3 25 per ton, all expenses paid, they can deliver coal in New York, leaving a magnificent margin for profits. It will cost less, by one dollar a ton, for delivery here than to Cumberland. Analysis proves the Dora coal to be of far superior quality to any in general use. It is nearly all pure carbon, with enough of bitumen to ignite with a bright, light flame; it contains not the slightest trace of sulphuret of iron, and its ash is pure white.

In addition to these inexhaustible coal beds, iron ore is also found in the greatest abundance, with easy facilities for working. A careful analysis shows this ore to contain fifty per cent. of pure metal, and as the fuel for extracting it exists on the spot, enormous quantities of iron can be produced, at a very moderate outlay in appliances. The lands where these remarkable deposits occur are of great luxuriance, and are very valuable for agricultural purposes.

SCRANTON

THE

COAL REGIONS

OF

PENNSYLVANIA,

BEING A

GENERAL, GEOLOGICAL, HISTORICAL & STATISTICAL REVIEW

Of the Anthracite Coal Districts.

ILLUSTRATED WITH

COLORED MAPS AND ENGRAVINGS,

AND

CONTAINING NUMEROUS STATISTICAL TABLES.

EDITED BY ELE BOWEN,

Associate-Editor of the Miners Journal.

"I will teach you to pierce the bowels of the earth, and from the caverns of the mountains bring out treasures which will bring strength to our hands, and subject all nature to our use and pleasure."—Dr. Johnson.

POTTSVILLE, PA.

E. N. CARVALHO &

1848.

Reference Department

Scranton Public Library
Scranton, PA

50686010663289
Bowen, Eli, b. 1824, ed.
The coal regions of Penns
ylvania,

Entered according to Act of Congress, by E. Bowen, in the Clerk's Office of the Eastern District of Pennsylvania.—1848.

PRINTED AT THE MINERS' JOURNAL OFFICE.

PRELIMINARY REMARKS.

"Words before blows."

In submitting the annexed pages to the public, we would not be misunderstood. The only object contemplated was the combination of such facts and statistics into a book of *reference*, as might prove convenient and useful to the man of business and others. While the necessary data to carry out this object was being collected, (and which—we may observe—required much time, trouble and patience) we employed our leisure moments in preparing the brief sketches herein contained.

We are duly sensible of the fact, that however much we may have desired to render the perusal of these pages interesting to the reader, the object has not been half gained. And when we, therefore, (supposing oneself arraigned before the bar of public opinion) sincerely hope that mercy may season the justice of our sentence, (the only hope of the *guilty!)* we do so with an abhorrence of the popularity which, under similar circumstances, the practice has obtained.

But although under an engagement during the preparation of this little work, which admitted neither cessation of duties nor diminution of time, we found such favor and assistance from friends, whom it would be ungrateful not to name in this connection.

Of these, we most particularly mention our indefatigable associate, (Mr. Carvalho,) who promptly entered into this publication with us at the outset, and who has not only satisfactorily performed the duties mutually assigned him, but has rendered important assistance in the department confided to us.

We are under obligations to Benjamin Bannan, Esq., (for twenty years past the editor of the Miners' *Journal*,) for the unmerited access which he kindly afforded us to the files of that valuable journal. We are also indebted to Richard Lee, Samuel B. Fisher, Wm. H. Mann, F. W. Hughes, Esqrs., Mr. Lewis, Mr. John Clayton, and others for favors of various kinds in the production of this book.

Of the authors quoted, we are, first, particularly indebted to the works of Mr. Richardson, Prof. Lyell, and the elementary treatise of Dr. Rushenburg, which we have followed in order in our geological essay; next to Wm. F. Roberts, Esq.; to the valuable Reports of Mr. Packer to the Legislature of Pennsylvania; the annual Reports of various Canal and Railroad Companies, and, last, the invaluable and learned work of Mr. Taylor, just published.

The reader will meet with a great number of typographical and other blunders, which he will have to excuse—there being no other alternative, that we can see. The matter was prepared in the greatest haste, and the proof sheets read amidst confusion and a multiplicity of other matters.

DEDICATION.

TO MR. BENJAMIN BANNAN.

DEAR SIR,—The position your have, for the last twenty years, occupied as the able and enterprising Editor of the Miners' Journal, and your untiring zeal invariably evinced thoughout this long period, in promoting the best interests of the Coal Trade of Pennsylvania, associates your name with every thing interesting connected with the Coal Regions. Permit us, therefore, to dedicate this work to you, as a trifling acknowledgment of the great assistance you have afforded us in the material created by your labors.

With sentiments of the highest esteem,

We remain, &c.

THE AUTHORS.

LH
622
B

gift "Elizabeth Chalmers, Librn Hobart College, Geneva, N.Y."
MAY 1945
MAY 14 '45 HOOVER

REVIEW OF THE COAL REGIONS

OF PENNSYLVANIA.

GENERAL GEOLOGICAL REVIEW.

PUBLIC LIBRARY
G4006
SCRANTON, PA.
77
85
89

Chapter I.

Formation of the Earth; Crust of the Earth; Internal Heat; Actions of Volcanoes, Earthquakes and Floods; Antiquity of the Earth; Primeval Climate; Vegetation of the Primeval Earth; Coal formation; Vegetable Origin of Coal: Theory of Dr. Buckland; Theory of Dr. Lyell; Deposition of Coal; Propositions of Prof. Richardson; Experiment of Dr. Göppart; Stratification of the Earth; Influence of the Atmosphere, Rains, Frosts, Floods, &c., upon the surface of the Earth: General Topographical Review, &c. Recapitulation.

With respect to the cause or causes which have brought about the things we are about to consider, it is much to be regretted that there is little authentic and positive data, beyond that provided by the science of Geology, which, though comparatively of recent origin, has done much to reveal the subline laws of Nature, and to develop the wisdom of the Supreme Being.

We are all wont to judge merit by the works which it has produced; and if praise can be awarded to the General who has succesfully achieved a victory under unfavorable chances; or to a builder whose fabrics are faultless in their architecture and finish; or to a statesman whose eloquence and wisdom are all-powerful in the Senate: what is not due to that Infinite Being, from whom the earth, and all which it contains, hath sprung:

"Who sees through all space, and yet in all the same;
Great in the small, as in the etherial flame:
Lives through all life, extends through all extent;
Spreads undivided, operates unspent;
—Warms in the sun, refreshes in the breeze;
Glows in the stars, and blossoms in the trees;
Breathes in our soul, informs our mortal part
As full, as perfect in a hair as heart."

—In the limited number of pages alloted to us in the consideration of these important and interesting Regions, it can scarcely be expected of us to present a full and complete view of its resources, formation, and characteristics. Such investigation must be left for abler hands, and for more ample room than is comprized within the limits of these pages. We shall therefore content ourselves with the presentation of such propositions only as are deemed essential to a correct appreciation of the subject.

Regarding the formation of the earth, perhaps the most philosophic hypothesis laid down, is that of the late Sir Wm. Herschell, and which is called the Nebular Theory.—Little can be deduced from the Bible, the oldest book preserved bearing upon the primeval earth. We are told that "in the beginning God made the heavens and the earth;" that "the earth was void and without shape, and that darkness dwelt over the face of the waters." With these words we can perceive nothing inconsistent in the theory of the eminent astronomer, which was based upon personal observations, forming mirrors, so to speak, reflective of the great laws of Nature. He was led to observe that every portion of that which is considered universal space, abounds in large expansions of attenuated matter, reflective of light, and which he termed nebulæ. These appeared, from time to

time, in different stages of condensation, and in various shapes, until, finally, they graduated into orbs of light,—suns and systems like our own. Our whole solar system is believed to have been thus created;—and the sun itself, which is supposed to be the centre of the system, having also primarily existed in the shape of nebulæ, must have thrown off, in the progress of condensation, the various planets of the sphere. The earth, therefore, having been thus formed out of gaseous vapor, soon changed to a fluid, and thence into a solid state. Being round, the outside was cooled, or frozen like ice upon the water; and as soon as this occurred, the general physical formations of the earth must have commenced, and the surrounding atmosphere, while it contributed to preserve the hardened state of the crust, also conveyed new substances, which in due time resolved themselves into land and water. Thence originated those germs of animal and vegetable life, which have presented those great phenomena which it is the peculiar province of science to explore.

Thus, it will be seen, that all which the earth contains, and the earth itself, has its origin in mere vapor; and no body, however hard or singular; no substance, however changed by the hand of Art, but can, through chemical aid, be converted into the original elements or gasses, and thus be made to vanish into air like thin smoke.

Ere yet the grand truths of science had directed our judgment, it was supposed that the human family was cöeval with the formation of the earth. An investigation, however, of the crust of the earth, (which, though perhaps from ten to fifteen miles in thickness, bears only the relative position to this planet, which the rind bears to an orange or an apple) will prove it to be of great and uncalculable antiquity. This belief is founded upon the various strata of rock, clay, and mineral formations which compose the crust of the earth, and which could have been accumulated only through a vast number of centuries.

The earth is believed to be filled with eternal fire, possibly generated and continued by some chemical action among its internal properties, or, as some scientific writers allege, from the original incandescence of the planet. However this may be, the existence of internal heat is universally conceded, and has been satisfactorily demonstrated by descents into the earth,—the temperature becoming warmer as the descent was continued. To this source, then, must we mainly attribute the volcanic outbreaks, which have occurred within the recollection of mankind, and the effects of which are traced in the history of nations. But we have in the earth physical evidences of primeval eruptions, far surpassing, in stupendous grandeur, those of more recent date, and before which the famed Vesuvius,—which has continued through eighteen centuries, to vomit out its burning lava,—fades into utter obscurity.

To volcanic eruptions must be added earthquakes, which may have served to extinguish the fires, from time to time, or caused them to break out anew at other points. Long periods of volcanic action were without doubt succeeded by floods, and thus the loose fragments of the former were gathered together with sand, gravel, and pieces of rocks, and intermixed with the saline compounds of the sea, were concentrated into huge blocks or boulders, similar to the icebergs of the present day, and in this shape deposited irregularly over the land. Thus, from time to time, land must have been carried off and inundated by the sea; and again, the sea receded from the land.*

Referring in part the cause of the superficial diversification of the earth to these great agencies—whose power none will question—we shall proceed with the consideration of another point, which will introduce the reader to the carboniferous deposits of the earth. Before abandoning the theory of the earth's antiquity, however, we may add that it is amply sustained by astronomical demonstration. When it is reflected that luminous bodies, situated millions of miles from our universe, must have required countless thousands of years ere their light could have penetrated to the earth, it will readily be conceded that the latter is of proportionate immensity in point of time, as the solar bodies in point of distance. If, therefore, we should undertake to determine the length of time in years, or even centuries, necessary to have brought about the changes which we behold in the earth's crust, we should be overwhelmed in the attempt.

To whatever cause Science may attribute the fact, all its votaries agree that the ancient earth possessed a universal climate; and they concede to it all and even more of the warmth than belongs to the tropical regions of the equator. Some writers, (and among them the celebrated Dr. Lyell, of England, whom we shall have occasion to quote before abandoning this subject,) think that the change of climate has been produced by the reversal of land into sea, and of sea into land; and imagine that, if a greater distribution of land now existed in the Southern hemisphere, and of water in the Northern, that the ancient climate would, in a great measure, be restored. But others, again, of equal celebrity with the former, refer the change to purely astronomical causes. Of these, the theory of Sir John Herschell appears to our view to offer the most claims to general acceptation. This is, that the amount of heat derived by the earth from the sun, decreases and multiplies with the eccentricities of the earth's orbit; and that this eccentricity is known to have gradually decreased, and still decreases;—hence he infers that a refrigeration of climate has been almost imperceptibly produced.

The belief in the previous existence of a universal climate is well sustained by the carboniferous deposites of the earth. These are believed to be of vegetable origin, as the prevalence of such a climate could not fail to

* *Note.*—The sea has receded several thousand feet from the City of Pompeii, since the eruption of Vesuvius.

be highly favorable to the propagation of vegetable plants. There are, indeed, some persons, entitled to respect, who do not coincide in the belief that coal is a vegetable production. But the opinion, after a thorough canvass in the scientific world for many years, has at last settled down into this belief, and we are induced to adopt it as the basis of our position.

Concerning the nature and origin of coal, we may here briefly introduce the theory of Dr. Buckland. He believed that the most early stage to which we can carry back its origin, was among the swamps and forests of the primeval earth, where it flourished in the form of gigantic *Calamites* and stately *Lepidodendra* and *Sigillariæ*. From their native beds these plants were transported into some adjacent lake, or estuary, or sea. Here they floated in the waters, until they sank saturated to the bottom, and being buried in the detritus of adjacent lands, became transformed to a new estate among the members of the mineral kingdom. A long interment followed, during which a course of chemical changes, and new combinations of their vegetable elements, converted them to the mineral condition of coal. By the elevating force of subterranean agency, the beds of coal have been uplifted from beneath the waters, to a new position in the hills and mountains, where they are accessible to the industry of man. From this fourth stage, coal has been removed by the labors of the miner, assisted by the arts and sciences, that have co-operated to produce the steam-engine and the safety-lamp. Returned once more to the light of day, and a second time committed to the waters, it has, by the aid of navigation, been conveyed to the scenes of its next, and most considerable change by fire; a change during which it becomes subservient to the most important wants and conveniences of man. In this seventh stage of its long and eventful history, it seems, to the vulgar eye, to undergo annihilation; its elements are, indeed, released from the mineral combinations which they have maintained for ages, but their apparent destruction is only the commencement of new *successions of changes*, and of activity. Set free from their long imprisonment, they return to their native atmosphere, from which they were absorbed by the primeval vegetation of the earth. To-morrow they may contribute to the substance of timber in the trees of our existing forests, and, having for a while resumed its place in its living vegetable kingdom, may, ere long, be applied a *second time* to the use and benefit of man. And when decay or fire shall once more consign them to the earth, or to the atmosphere, the same elements will enter on some further department to their perpetual ministration in the economy of the material world.

Prof. Lyell, the eminent geologist of England, who visited the coal formations of the United States in 1841, made some interesting observations touching the origin and manner of deposite of the coal strata. We shall offer no excuse for laying before the reader, in this place, a brief synopsis of his views. That which we call coal, says Mr. L. is merely the assemblage of strata which rests on the older sandstone, and in which is found that invaluable fuel; and although the quantity in which it is contained is very small in comparison with the bulk and volume of the other strata, there is still great interest and importance attached to it. We see that, in going from the highest to the lowest beds yet discovered, the coal occupies quite an ancient position—one indicating a formation low down in the sea, as we have above it the most modern formations. We have first the past-Pliocene, then the Tertiary formation; then the chalk, which is made up of calcerous matter formed, mostly, (at least in Europe) from decomposed shells and corals, and of those green marls which are found in New-Jersey, and are of such extensive use in Agriculture; then we have the Jura limestone, or Oolite, in which also are masses of coral, like the common coral reefs; below this are two other groups, and lastly, we come down to the carboniferous or coal-bearing stratum, which rests upon the sandstone beds, or the limestone containing corals, and which, like every other formation, contains species of animals, shells and plants of different species, from those immediately antecedent, or following. Below this again we see limestone and shale, which enter most largely into the structure of the rocks of the state of New-York, and which abound in fossils.

Now, a great change must have been experienced before the coal-period, when the fossils were deposited. He was indebted to Mr. Sapwitch, an eminent civil engineer, for copies of some models prepared by him of those sections, which are faithful and accurate representations of actual localities, as was fully verified by Dr. Buckland and himself in examinations which they made in the spring of 1840. The different strata of sandstone, shale and conglomerate, of which the carboniferous formation is composed, are here represented. The sections represent facts ascertained in cutting perpendicularly through the New Castle coal district. They are not hypothetical, but are founded upon exact measurements. In one of these sections, the dip of the beds is at an angle of 20°, while the slope of the valley is 40°. In the other the dip is 50°, and the slope of the valley in the same direction is 20.° In these two cases, therefore, the relation of the slope of the valley, and the dip of the beds is reversed. In both cases, also, the slope of the valley and dip of the beds are to the south, (to those who are not acquainted with these technical terms, it may be proper to say, that the deviation from a horizontal plane of the beds is called the *dip*, while the *strike*, as it is called, is the extension of the strata, in a direction at right angles to the dip.) In this case, as the dip is to the South, the strike must be from East to West. The flexures of the valleys depend on their inclination relatively to the dip; and these two sections cut through beds of coal, and shale, and sandstone—the shale being an indurated clay—are illustrations of cases in which the two strata come up to the

surface according to the various relations of the slope of the valley and dip of the bed. It is a rule among miners, that when the dip of the beds is less steep than the slope of the valley in the same direction, then the V's, as they are termed, will point *upwards;* those formed by newer beds appearing in a superior position, and extending higher up the valley. But where the case is reversed, and the dip of the beds is steeper than the slope of the valley, then the V's point downwards, and those formed of the older beds appear uppermost. These rules may often be of great practical service in many cases. For example, suppose a miner first to begin his operations in one valley with the structure of which he is familiar. If he should sink his shaft through the formations above, he would come to the coal which is below. But suppose one unacquanted with these rules should go to another valley—(and in England he might easily go to such a valley, for the cases, as before stated, are not hypothetical) He might,—continuing along the same side of the hill as he had in the other valley, where he observed the same *outcroping* of the coal seams—suppose, (reasoning from his former experience) that he was safe to begin his workings in the bed at the highest part of the valley, with the expectation of coming down to the other bed. But he would be disappointed, as will readily be acknowledged by understanding that the uppermost bed is the lowest down in the valley, and that the lower bed is the highest up. An acquaintance with these rules, and their application, is of the greatest importance to those speculating in mining transactions.

In the coal fields of Pennsylvania, (near Pottsville,) Mr. Lyell saw an examplification of the cases here alluded to. In the coal of the same valleys, the V's, in some cases, pointed one way, and in the others in the opposite—the dip and slope being both towards the South. There is nothing more singular, or which has struck Mr. Lyell more forcibly in respect to the coal fields of this country, than their close resemblance to those of Europe, and of England in particular. He had travelled on the North side of the Alps towards the South, and was astonished to find minerals of fossils of entirely distinct genera from those met with in the Pyrenees. Nor have the chains of Mountains anything to do with this remarkable change—for the beds were formed at the bottom of the sea before the mountains existed. Observing this great change, then, in the short passage of a few hundred miles, it seemed to him not surprising that. in passing at the distance of three or four thousand miles, from England to the Appalachian chain in Virginia, he should find the coal measures the same as those he left behind,—represented in the red saudstone, and containing white grit and slaty shales, and clays not slaty, and beds of conglomerate containing quartz pebbles.

Mr. Lyell next proceeds to the discussion of the probable origin of coal, and unites in the opinion now generally entertained by geologists, that it is a vegetable production.—Whatever dispute there may have been on this subject, he thinks it was settled when a portion of the New Castle Coal, some years ago, was submitted to a *microscopic examination*. After cutting off a slice so thin that it should transmit light, it was found that many parts of the pure and solid coal, in which geologists had no suspicion that they should be able to deduct any vegetable structure, not only were the annular rings of the growth of several kinds of trees beautifully distinct, but even the medullary rays, and what is still more remarkable, in some cases, even the spiral vessels could be discovered. But besides these proofs from observing a vegetable structure in the coal itself, there has been found in the shales accompanying it, fern leaves and branches, as well as other plants, and when we find the trunks of trees and the bark converted into this same kind of coal as we find in the great solid beds, no one will dispute the strong evidence in favor of the vegetable origin of this coal. If we find a circumference of bark surrounding a cylindrical mass of sand, we know that it has been a hollow tree filled up with sand, nor can there be any doubt that the coal is formed of vegetable matter. No less than three hundred species of plants have been well determined by botanists; some of whom have devoted a great part of their lives to this study. From this it is to be inferred that the carboniferous formation of Europe and America is made up of comparatively recent plants. He thus alludes to three or four of the most peculiar facts, which lead to this conclusion:

In the first place the boughs and leaves of ferns are the most frequently and strikingly met in America as well as Europe. So perfectly have they been preserved that there can be no doubt that they are really ferns; and in some cases even their inflorescence has been preserved at the back of the leaves. Where we have not the flowers and prints remaining we have found it possible to distinguish the different species of fossil and ancient ferns by attending to the v ining of the leaves. At least one hundred species are determined in this way. The most numerous of those vegetable veinings are those which have been called *Sagillaria* or *tree ferns*. Their stems are found to be fluted vertically, and in the flutings are litt'e stars, as it were, each of which indicates the place where the leaf was attached; and it is evident, as M. Brongniart has shewn, that although the bark of these trees is so well marked that forty-two species have been described; yet there is never found any leaf attached; while we have in the same beds leaves in abundance which have no trunks. The natural inference is, that they must have belonged to the aborescent ferns; as, for instance. the section *Caulaptoris* is admitted by all to have belonged to this species. The fact is also important because the tree-ferns, and especially the *Caulaptoris*, are now known to be exclusively the inhabitants of a *warm and humid climate*—much more hot and moist than in those parts of the globe where coal now abounds. For we find

coal not only in England and Nova Scotia, but as far North as Mellville's Island and Buffin's Bay, in a climate where the growth of such fern plants is dwarfish and stinted. It is evident that when these vegetables existed there must have been a warmer, and probably a more equable climate than is now found even in warmer latitudes.

The climate in Northern latitudes was then much warmer and more moist than it is now in any part of the globe. The same thing is made evident by a comparison of their fossil *Sagillaria* with those which now attain their greatest size in the islands of the Pacific. He had found several plants, as the *Asterophyllites*, in the Appalachian Chain, and which are also found in Nova Scotia and Europe, which cannot certainly be referred to any living families. These all, however, bespeak a terrestrial vegetation, though occasionally found mixed with marine shells and corals.

Another class of fossils common in coal shales is the *Lepidodendra*, somewhat allied in form to the modern *Licopodiums*, or white mosses. Though the mosses of the present day are never more than mere shrubs, even in the warmest regions, yet, at the carboniferous period they attained an enormous development, being forty, fifty, or even seventy feet high.

There have been two theories to explain how these plants could have been carried into the sea, estuaries, or lakes, and drawn beneath the water and accumulated in the strata, so as to form coal. One of them asserts that the plants must have been drifted and buried in the water, since we find them intercollated between different stata of shales; just as plants lie between the leaves of a botanist's *herbarium*, and are pressed together, so have these ferns been found flattened between the seams of shale. They have been carried from the place where they grew, drifted out to a certain distance, water-logged and sunk in the mud, and other strata deposited above them,so as to form this intercollation between the different leaves of clay.

But many believed, from seeing the roots, that the plants grew on the spot where we now find them. But when we come to observe that these roots terminate in different strata, it will seem evident that they were carried down, sunk and struck in the mud, as snags are now in the Mississippi. In the Quartose sandstone at St. Etienne, near Lyons, are found a vast number of those *Lepidodendra* and *Sagillariæ*. No one apparently can doubt that these drifted to their present position, and that they were afterwards covered with sand brought down by rivers. Many appearances favor this hypothesis. Sometimes we find beds of marine shells, then vegetable matter, and then a mixture of fresh water and marine shells.

But though these facts may be thus explained, the discoveries that are being made lead geologists to come round, more and more, to the opposite view of the case—to the hypothesis which refers the growth of large beds of coal to the increase on the spot—after the manner of peat, as it is seen in cold and dark climates. This may appear contradictory to what has been said with regard to a change of climate since the carboniferous era; but it is not necessarily so. The opinion of Werner, confirmed by the speculations of Brongniart, led him to believe, contrary to his early impressions, that by far the greater part of the coal had grown on the spot where it is found. Accumulating like peat in the land, the land must have been submerged again and again, to allow the strata of sand and mud to be superimposed as we now find them.

In excavating for coal at Belgray, near Glasgow, in 1835, many upright trees were found with their roots terminating in a bed of coal; and only seven years ago, in cutting a section of the Bolton railroad in Lancashire, eight or ten trees were found in a vertical position; they were referable to the *Lipidodendra* species, and allied *Licopidiums*, or club mosses. All were within forty or fifty feet of each other, and some of them were fifteen feet in circumference at the bottom. The roots spread in all directions, and reached beds of clay, and also spread out into the seams of coal. There is no doubt that these trees grew where they are found, and that the roots are in their original position. The seam of coal has possibly been formed of the leaves which fell from the trees. This is a singular fact: that just below the coal seam, and above the covering of the roots, was found more than a bushel of the *Lepidastrobus*—a fruit not unlike the elongated cone of the fir tree. It has always been imagined that the *Lepidastrobus* was the fruit of the *Lepidodendra*, but here they are found beneath other trees.

Under every seam of coal in Wales is found the fire-clay—a sandy, blue mud, abounding in the plants called *Stigmaria*. First is the seam of coal, then the fire-clay, then another seam of coal, and then the sandstone. In one open part of the Newcastle coal field, about thirty species of *Sigillariæ* were discovered; the trunks were two or three feet in diameter. They pierce through the sand in a vertical direction, and after going for some eleven feet pendicularly, the upper part bends round horizontally, and extends laterally into the sand—and then they are so flattened by the superincumbent strata, that the opposite barks are forced within half an inch of each other. The flutings are beautifully preserved in the flattened horizontal stems. Here had been an ancient forest growing in a bed of clay—buried in some way with sand to a certain depth, and then the upper part was bent and broken off by the water current, and buried in layers of shale and mud. There are many cases of this kind in Wales, where the roots of the trees evidently preserve their original position. Mr. Logan, an excellent Geologist, has examined no less than ninety of these seams of coal in Wales. They are so exceedingly thin that they are of but little value in an economical light—yet, they are just as important for geological purposes, as if they were thick strata. Under every one of the ninety, he has

found the fire-clay, a sandy mud, containing the plants called *Stigmaria.* It was discovered years ago that this fire-clay existed with the coal mine; but it was not known that it was the floor of every coal seam, and not the root, which contained this plant in a perfect state. The *Stigmaria* appears in the under-clay (to use the term employed by the miners,) a cylindrical stem, from every side of which extends leaves—not only from the opposite sides, but from every side, they appear like tubercles, fitting on as by a joint. They radiate in all directions in the mud, where they are not flattened like the ferns. Had they been, we might have had leaves in two directions, but not on every side. These plants resemble the *Euphorbiaceæ* in their structure, and in some respects are analogous to the caniferous or fir tribes. In their whole structure they are distinct from all living genera or families of plants. In one instance a dome-shaped mass was found with stems and leaves—some of the branches being twenty or thirty feet in length, and sometimes longer. It has been thought by Dr. Buckland and other Geologists, that those plants either trailed along in the mud at the bottom of the swamps, or to have floated in lakes like the modern *Stratiotes.*

After Mr. Logan had arrived at this remarkable fact, Mr. Lyell became particularly desirous to know if the same fact was true in the United States. When he arrived here in August, 1841, he had no idea how far it was true, yet it was known the *Stigmaria* did occur; and his first opportunity to inquire into the fact was at Blossburg, in the Bituminious field in the Northern part of this state. His first inquiry of the geologist was, whether he found *Stigmaria* there. He received in answer an affirmative reply; and on being asked if the plant occurred in the *under clay,* he said that they could soon settle the point. Whereupon, he had one of the mines lighted up, and the only plant *they could find in the under clay was this Stigmaria.* It existed in abundance—its leaves radiating in all directions, just as in Wales, more than 4000 miles distant. The same cretal appearance was preserved. In the roof of the coal seam were seen different species of ferns,—*Sigillariæ* and *Calamites,* just as in North Carolina and in Wales. Afterwards another opportunity occurred in the Pottsville region of Anthracite coal. Prof. Rodgers, the state Geologist, who, though well acquainted with the strata of the district, was as anxious as Mr. L. to know if the rule would hold good, examined first at Pottsville, and then at Mauch Chunk, and the same phenomenon was observed at both points. In the first coal mine they came to, the coal had all been quarried away, (for the work was carried on in open day,) and nothing but the cheeks of the mine remained. The beds, as they have been horizontal, are now not vertical, but have gone through an angle of little more than 90°, and turned a little over; so that what is now the under side was originally the upper; therefore, the cheek on the left side was originally the floor of the mine. They now looked at the lower cheek; and the first thing they saw was the *Stigmaria,* very distinct; on the other side, but a little way off, were ferns, Sigillaria, Calamites, Asterophyllites, *but no Stigmaria.* So it was at Mauch Chunk, where they found one thirty feet long, with leaves radiating in all directions.

It has now been ascertained for many years that Prof. Caton was quite correct in affirming the Anthracite and Bituminous coals to be of the same age. This is shown not only by their relative position with regard to the red sand-stone, but from the plants found in both being identical.

All the coal fields, therefore, may be regarded as one whole, and the question will occur, how did it happen that the great floor was let down so as to prevent the accumulation of coal, and yet plants of so different textures should be found in it. It has been suggested that these plants grew in the swamps; and it is possible to imagine that there may have been morasses fitted only for the growth of the species of plants called *Stigmaria;* and that as this marsh filled up, this and the other plants became dry, and the leaves accumulated one layer above another, so as to form beds of coal of a different nature from those that preceded. We know it is a common thing for shallow ponds to fill up gradually with mud and aquatic plants, and at last peat and trees are formed upon them. A corresponding change is constantly going on in different parts of Europe—the same transition from bogs and marshes to a soil capable of supporting various great trees is taking place, and then the ground is submerged; for always, again and again, we must refer to this subsidence of the soil.

Those who have seen the morass called the Great Dismal in North Carolina and Virginia, may possibly have had an opportunity of crossing the northern extremity of it on a railway supported by piles, from Norfolk to Welden. There is no less than forty miles from North to South, and twenty from East to West, covered entirely with various forest trees, under which is a great quantity of moss; the vegetation is of every variety of size, from common creeping moss to tall cypresses one hundred and thirty feet high. The water surrounds the roots of these trees for many months in the year. And this is a most singular fact to one who has travelled only in Europe, that, as is the case in the United States, trees should grow in the water, and yet not be killed.—This Great Dismal was explored some years ago by Mr. Edmund Ruffin, author of the valuable Agricultural Journal. He first calls attention to the fact that a greater portion of the vast morass stands higher than the ground that surrounds it; it is a great spongy mass of peat, standing some seven or eight feet higher than its banks, as was ascertained by careful measurements when the railroad was cut through. It consists of vegetable matter, with a slight admixture of earthy substance, as in coal. The source of peat in Scotland is, that one layer of vegetation is not decomposed before another forms. So is it in Chili, Patagonia and Terra del Fuego. Thus, also, is it in dif-

ferent parts of Europe, in the Falkland Islands, as Darwin has shown. Thus, too, is it in the Great Dismal, where the plants and trees are different from those of the peat in New-York. It is found on cutting down the trees and draining the swamp, and letting in the sun, that the vegetation will not be supported as it was before, beneath the dark shade of the trees. In the middle is a fine lake, and the whole is inhabited by wild animals, and it is somewhat dangerous to dwell near it by reason of the bad atmosphere it creates. It is covered by most luxuriant vegetation. It is found in some places in England, that there is a species of *walking-mosses*, which are sometimes seized with a fancy to walk from their places; the moss swells up, bursts, and rolls off, sometimes burying cottages in its path. In some places this peat has been dug into and houses have been found several feet below the surface—curious antiquarian remains. In the same manner the Great Dismal may spread itself over the surrounding country.

—Conceding the vegetable origin of coal, predicated mainly upon the existence of a previous universal climate,—no less than from the impressions of vegetable matter in the body of the coal, which are daily encountered by the miners: as well as from the reasons assigned by the eminent writers just quoted;—there exists some difference of opinion regarding the probable manner of its deposit. Before considering this point, however, we will submit a few remarks concerning the flora composing the coal formation.

At the period of the coal-bearing series water, no doubt, was very generally intermixed with the land. Lakes, rivers, and creeks did not, in all probability, exist as they now do; for the obvious reason that, although the earth had already experienced some violent upheavings, it must have partaken more of the appearance and characteristics of our Western prairies, than of the mountainous ranges which now distinguish the surface. The land must generally have lain in flats, or swamps, and been thoroughly impregnated with water. These flats were continually overgrown with rank vegetation; which, from the best information provided by fossil-botanists, comprized over three hundred varieties of plants and trees. Of the former, by far the largest number belonged to the monocotyledonous species: while the latter are related to the tribes of fern, palm, bamboo, etc. which still flourish in the tropical regions. Besides these, were species of mosses and creeping vines, which do not appear to be allied to any kind now living. The coal-vegetation, in fact, may be said to be analogous, if at all, to those plants only which are developed in certain low and humid islands, in the warmest latitudes;—for it is in such climates that the oil of flowers and of trees is found to be more inflammable than in colder localities, because they decompose no carbonic acid, but convert the oxygen of the atmosphere into carbonic acid. But however closely these may be allied to the coal-bearing plants, they can form no comparison with them in point of dimensions—the smallest plant, in that period, having assumed the proportions of our loftiest forest trees. Of the bamboo, which is in the East a principal production, and in many parts of China is extensively cultivated in plantations, it grows from fifteen to seventy feet in height, and from five to fifteen inches in diameter. The trunk is hollow and full of joints; and the growth of the tree is very rapid—a healthy tree not unfrequently attaining the height of from fifteen to twenty-five feet in as many days. The leaves are enormously large, and the soft shoots of the tree are used for food, while the succulent matter of the joints affords a wholesome and nourishing liquor. This, with the other primitive species, would grow in immense groves, which were frequently overgrown by stupendous vines, forming a picturesque, wild amphitheatre.

The heat of the climate, operating upon the water beneath would, of course, generate an effluvium highly calculated to expedite the growth of the vegetable matter, and which, in the shape of gas, entered thus largely into its properties. The influence of the climate upon vegetation, and which must have been all-powerful at this period, is strikingly illustrated by those phenomena, occurring at the present time in certain parts of the globe, (and in a peculiar manner in the Dismal Swamp region alluded to by Mr. Lyell) where the trees are poisonous, and the atmosphere, being filled with their unwholesome emissions, is dangerous, if not at once fatal to animal life. The most remarkable instance of this phenomenon is found in the Island of Java, where, either from the trees or from the rocks, a certain kind of gas is emitted which repels the approach of man. A similar phenomenon during the coal-epoch might, possibly, account for the paucity of animal fossils; or, at least, might be supposed to have exercised a peculiar and important agency in its vegetation, and subsequent conversion into its present state. The water, too, must have been of a peculiar character—totally unlike ours, since it could not have been affected, in any degree, by the minerals which in our day enter more or less largely into its properties. We shall venture no conjecture as to its condition and qualities at that period—but content ourself with conceding, in general terms, that however affected by immediate or extraneous circumstances, it was better calculated to preserve and to *mineralize* the vegetable matter, than the water of our own time would have been.

The vegetable *meteriel*, therefore—having been preserved in the manner suggested—must now have undergone various chemical changes, whereby the whole may have been resolved into a compact body. For this a process similar to that by which the concretions found in the great caverns of Kentucky and Virginia are produced, might be suggested—though these are formed from the accumulated drippings of the water, like ice on the sides of hills. Nevertheless, from the humidity of the climate, the water might have had a similar influence, and covering and intermixing with

the rank vegetable matter, may, indeed, through some chemical action, have produced a *fermentation*, which prepared it for subsequent, and not less important changes and positions.. Finally the stratum would be gradually covered over, by the detritus of periodical overflows, or, (as is explained hereafter,) by the whole bed sinking down into the sea, and thus accumulating the saline matter which is interspersed between the layers of coal. This covering, however produced, effected the most important change in the vegetable matter. The overlaying accumulations of detritus, shutting in the original gases of the vegetation, by pressure produced the *fermentation* of the whole mass, by means of which *coal was soon produced*, and the beds thus again prepared for further vegetation.

This proposition is well sustained by facts which are within the knowledge of almost every one; and which are, indeed, self-evident: If a stack of hay, for example, were exposed in a moist condition, or were too closely packed, fermentation and ignition would be produced, and the hay would undoubtedly be consumed. But if the process be interrupted and combustion prevented, the hay will be found to have acquired a brown color, an oily surface, and a bituminous odor. The same phenomena are observable in flax; and all other vegetable substances, if similarly exposed, will produce similar results. Thus, were any vegetable matter in a moistened condition, placed under heavy pressure, so as to prevent its gaseous substances from escaping, bitumen or coal would be produced according to the various stages of its progress. Vegetable matter, (says Mr. Richardson,) has been traced through every stage of the saccharine, vinous, acetous, naphtha, petroleum, bitumen, lignite, jet, coal, amber, and even the diamond.

The experiments of Prof. Göppert, which have been followed in England, further demonstrates the vegetable origin of coal, and places it, in fact, beyond the possibility of a doubt. Having observed that the leaf, in ironstone nodules, might occasionally be separated in the form of carbonaceous film, the learned *savant* placed fern-leaves in clay, and then in the shade, exposed them to a red heat, and thus obtained striking resemblances to *fossil plants*. According to the degree of heat, the plant was found to become either brown, shining, black, or to be entirely lost, the impression only remaining; but in this latter case, the surrounding clay was *stained black*, thus indicating that the color of the coal-shales is derived from the carbon of the plants which they include.

The *manner of deposit* of the coal formation has generally been conceded to the agency of floods and drift, as alluded to in the synopsis herein presented of the theories ol Dr. Buckland and Mr. Lyell. But this belief has of late encountered some serious opposition (as stated by Mr. L.) in the promulgation of a new theory in England, and which has now many and eminent followers. The objections applying to the idea that coal was deposited or formed by drift, are laid down by Prof. Richardson, (who does not himself hesitate to acknowledge his belief in the theory) of which the following synopsis may serve to present the outlines: The purity of the coal, and its freedom from extraneous substances, it is contended, are averse to drift; for had it been drifted in the manner conceived, it must infallibly have acquired some portion of foreign substances in its transit, such as pebbles, gravel, &c. But, since we find extensive seams of coal, utterly unmixed with any other matters, its freedom from these is considered to be incompatible with the idea of its having been carried to a distance by water. The generally uniform thickness of each seam presents another difficulty. Some coal seams are known to cover an area of several hundred square miles, sometimes thick and sometimes extremely thin, but each seam of generally uniform thickness and quality. Had the coal been wafted away, the probability is, that no such uniformity of thickness and dispensation would have occurred; but that, on the contrary, the mass, from the different specific gravity of its portions, as well as from other causes, would have been deposited in an extremely unequal manner, in heaps and hillocks; whereas, no such effects are observable. The size of many of the coal-seams, considered with reference to the immense weight which they have undergone by the overlaying strata, is considered another objection of insurmountable magnitude. The enormous extent to which the bulk of substances may be reduced by pressure, is strikingly exhibited by an incident which occurred in an English mine, and which is related by Mr. Burr: A mass of rubbish, which was left in a worn-out vein of iron-stone, during a period of only two years, was in that short interval reduced from seven to no more than *two feet* in thickness, owing to the pressure of the overlaying weight —and when found, it had formed into so hard a substance, as to present one mass of rock, which could only be penetrated by the operation of blasting. Now, when we consider the far greater compressibility of vegetable matter than mineral detritus, and reflect that the beds of coal have been subjected to the pressure of masses, not of a few yards, but in many instances, of many thousand feet in thickness, and this during a period not of a couple of years, but of countless ages of the past,—it will appear self-evident that for the formation of such deposites, supplies on the most enormous scale would be required, and that it would be utterly impossible to transport them by the action of water, so as to produce the results we witness. Again, the high state of preservation in which many of those objects occur, the perfect condition of the leaves and parts of fructification of many of the ferns, the sharp angles of numerous stems of plants which are presumed to have been of soft and succulent nature, and with the surfaces of others marked with lines, streaks, and flutings so delicate, that the mere *drifting of a day* would inevitably have destroyed them— these, with facts of a like nature, and leading to similar conclusions, lead to the belief that

these objects have never been accomplished by drift, but that they *are buried on the spots where they lived and flourished.*

Again, it is contended, that if vegetable matter were swept away by a flood, such an agency, by allowing the gaseous particles to escape, would never be adequate to produce the desired results, and that coal never could be formed by such a process. Coal itself (or some kinds of coal at least) if buried in the water for any considerable length of time, would loose largely its igneous properties, and finally crumble away as its gases escaped.

But, finally, the multiplied instances of trees found erect on the spot where they unquestionably grew, is considered sufficient to overthrow the idea of transport altogether, and to establish the fact of the Coal having chiefly grown on the spot where it is now found.

The alternation of beds of coal with marine deposits is explained by Mr. Richardson by the supposition that extensive subsidences of the estuaries, which were the site of the lacustrine and terrestrial vegetation just described, may have *reduced* these estuaries beneath the level of the sea, where the submerged soil, with its vegetation, was covered with accumulations of encrinital limestone and other marine sediments; and that, in course of time, either by drifts of sand or clay from the land, or by the elevation of the bed of the sea, the estuaries were again filled and become the area of the vegetable growth above named, while the repetition of such changes would account for the alternations of marine and vegetable deposits which occur in our beds of coal.

Having thus dwelt somewhat minutely upon the coal formation, and the geological phenomena to which it is allied, we will, in conclusion, take a retrospect view of the strata of the earth, and the means which have, from time to time, modified and changed its configuration. We perceive, by excavations made for railroads and canals by the side of mountains, that there are various layers of rock, clay, sand, coal, &c., reposing one above the other.

As stated in the commencement of this chapter, the origin of our earth must have been a mass kept in a strata of fusion by heat, and that its surface become hard by having gradually cooled. The most ancient part of the earth is composed of granite, which appears in an unstratified mass, and bears every indication of an *igneous* origin. There are some kinds of granite, however, of comparatively recent origin, which so clearly resemble the ancient rock as to be sometimes difficult to distinguish one from the other. Gneiss is a rock very analogous to granite. It is stratified, however, and seems to have been formed under water. It alternates with micha-schist, which ordinarily accompanies granite and gneiss. Next we have argillaceous schist, which was also formed under water, and which is of a soft, slaty nature, and easily split.

These rocks, whose origin is cöeval with the creation of the earth, are frequently found at the top of mountains, as well as at the lowest depths of the earth,—which goes to prove that the earth has, at various periods, been subjected to the severest upheavals and internal convulsions. Among these rocks, *no fossils* have ever been found, and it is thus certain that animal and vegetable life did not exist at this early period of the earth's history.

It is in the next, or second geological epoch, called the Transition formation, that the first traces of the existence of vegetable and marine life, on the surface of the globe, are found. Previous to this period, and perhaps as a prelude to the introduction of life, the former rocks had been disturbed, as above mentioned,—for we do not find the strata of the Transition formation in parallel layers over the primitive beds; but on the contrary, they are deposited in the greatest apparent confusion.

Geologists have divided this formation into three divisions, which are called respectively the Cambrian, the Silurian, and the Devonian systems of rocks. The former are the oldest *sedimentary rocks* known, and are composed of schistose grauwackés, mica-schists and gneiss. The Cambrian rocks contain organic remains of various brachiopods, polyparia, coral animals, &c.

The Silurian System, which is next above the Cambrian, comprises an upper and lower strata, and is very nearly similar to the Cambrian rocks. The strata are exclusively of marine origin, and whole beds are composed of shells, corals, &c., and those peculiar crustaceons termed *Trlíobites*, and which, being rarely found in other situations, are characteristic only of the Silurian and Devonian strata.

After the revolutions which seem to have terminated the primitive epoch, the earth must have remained for a long time in a state of repose, as we find in the third geological period, denominated the Secondary formation, the stratum called the *old red sandstone*, —consisting of a mass of rocks and pebbles, cemented together, having been transported and accumulated through the action of water, and upon which rest the *carboniferous deposits.* This formation is composed principally of marine fossils, the varieties of which are very numerous. The mountain limestone, and metalliferous limestone, in which are found ores of lead, copper, zinc, &c., besides numerous descriptions of organic remains, belong to this formation. Next comes the coal formation, and as previously stated, this is exclusively composed of vegetable matter, formed as aforesaid, and in which marine or other fossils are rarely found.

A violent convulsion seems to have terminated the coal period, which was succeeded by what is called the Saliferous formation—being the fourth geological epoch. In this are found the red conglomerate, new red sandstone, &c. very often deposited in layers from one to five hundred feet deep. Few organic remains are found in these beds; but it was at this time that the animals belonging to the class of reptiles were created.

In this epoch are embraced several formations, (mostly of local names) which, not being essential to our present purpose, it is unnecessary to enumerate.

The fifth geological epoch, embraced in the Secondary formation, comprizes what are called the Liassic, the Jurassic. and the Oolitic systems. Previous to this epoch, the earth was inhabited only by certain plants, and a few inferior animals and reptiles; but at the commencement of this formation, a new fauna was created—composed of animals and reptiles of strange form and gigantic size. Rocks of the Jurassic system, as also those of the Liassic, are not met with in this country. and we therefore avoid a description of them, as well as the fossils which they contain.

In the sixth geological epoch, also in the Secondary formation, we have the lower or inferior cretaceous system, abounding, as the latter mentioned series, in marine and animal fossils. This formation contains limestone, with here and there deposits of gypsum, clays, sands, iron ores, &c. In England, under the name of *Wealden formation*, are deposited, in alternate layers, limestone, sand, and clay, all of which are frequently of great thickness. Above the Wealden formation is a group of deposites of green sand, in which are distributed particles of silicate of iron, which are also found in New Jersey. Higher up are again found limestone, sandstones and chalk marls, the stratification of which is only indicated by layers of flint in the latter. Beds of the cretaceous group are found in New-Jersey and other parts of the United States, but they rest on the oldest secondary rocks, without the intervention of the Oolite.

The next formation, (and the seventh geological epoch) is called the *Tertiary* formation. Between the commencement of this epoch, and the termination of the chalk strata, all traces of ancient or primitive remains are lost; the fossils which are found in the subsequent formations being but types of existing organic creatures.

The Tertiary formation is divided by geologists into the Eocene, Miocene, and Pliocene; or the older, middle and newer Tertiary groups. The first named strata is developed in the states of Virginia, North and South Carolina, Georgia, Alabama, &c. It consists principally of greenish sands, nearly identical with the cretaceous series, and of the same mineral qualities. In Paris it embraces layers of limestones, marls, and siliceous matter;—while in London it forms stiff and again plastic clays, which are useful for manufacturing purposes. Above these layers occur various kinds of clays, limestones, marls, gypsums, &c., the latter of which being extensively used in France for the manufacture of Plaster of Paris, &c. Above the gypsum we find a more modern group, composed of marls, sands and flints—the first a marine, and the other a fresh water deposit.

The Miocene beds prevail on the Continent of Europe, and in America along the shores of the Chesapeake Bay, and in some parts of Virginia. They abound in fossils, and consist mainly of shells, sands, sandstones, and conglomerate of gravel, &c., which are hard enough for building stones. In some portions of the globe, the Miocene series present combustible materials—and remains of dicotyledonous plants abound in them in Switzerland, Germany, Italy, &c.

The Pliocene beds of the United States are of comparatively recent origin. They are found in New-York, Kentucky, and along the banks of the Potomac in Maryland. In Europe, *brown coal*, or lignites, is found in layers, which can be advantageously worked. The beds extend all over the old world, and their mineral properties vary in different points; and at some places they exhibit evidences of far greater age than at other points. They consist mainly of marls, sands, and remains of marine, fresh water, and land animals.

In this formation are also embraced superficial deposits of drift, consisting of gravel, boulders, sand, clay, &c. There are two kinds of drift, one called the ancient or *diluvium* and the other the modern or *alluvium*. In the former, which covers over the Tertiary formation, are found fossils which date not very far back from the present period,—as the diluvial period, in a manner, unites the Tertiary with the recent past. In these deposits are found bones of extinct and recent genera of animals, and among them those of the *Magatherium*, the skeletons of which measure eighteen feet in length, and about nine feet high. This animal is much larger than any subsequent animal, and the thigh-bone is believed to be three times as great as any known elephant. In this period are also found remains of elephants, horses, rhinoceroses, &c. It is to this period also that geologists refer the immense masses of debris which contain gold, platina, and the diamond, in Brazil, Africa, India, &c., as well as the veins of tin in England and Mexico. The formation known as the Boulder or erratic block formation, also belongs to the Diluvial period. All over the world these boulders have been deposited. In some places they are of huge proportions and weight, while ordinarily they consist of gravel stones, of more or less greatness. They are composed of various mineral material, and not unfrequently are pure and hard granite.

In the United States many of the valleys are filled up to a great depth with the modern or alluvial deposites. They consist mostly of a heterogeneous mass of earthy matter, brought down from the higher lands by rains and freshets. Bones of the buffalo, the elephant, and other animals, are found in these beds; and skeletons of the celebrated *Mastadon* have been exhumed at different localities.

It is in the modern formation, comprising the eighth geological epoch, that the first traces of the human family have been discovered; and although it is possible that its origin may date farther back than can be supposed from the evidences furnished by the exposed land, yet geologists generally unite in the belief that no earlier records appear in that portion of the earth covered by the sea.

Immediately previous to the modern epoch, the earth seems to have enjoyed a repose of long duration. With the exception of a few upheavals occurring during the latter portion

of the diluvial period, there has been no catastrophe of any moment; and all the changes which have taken place "since the great flood" have been brought about by various causes—by those gradual and almost imperceptible agencies which, continuing from centuary to centuary, and from thousandth year to thousandth year, will, sooner or later, have brought the world to another grand epoch.

Having thus desultorily traced the order of strata, we may add that it is always *regular*. We can never find coal, for example, below the more *ancient* formations; nor an ancient stratum overlaying a modern one. Thus we perceive the value, in an economical view, of scientific knowledge. Thousands of dollars have been, and are still expended by the uninformed, in explorations after mineral treasure, which, did they but enjoy a limited knowledge of those paramount laws which pervade throughout all the Creator's works, could be saved; besides the labor, anxiety and bitter disappointments which invariably attend ill-directed enterprizes.

—In casting our eye over the surface of the earth, we everywhere perceive evidences of a universal and continual change. The frosts of autumn; the snows of winter; the rains of spring; the electricity of the summer—each contribute to this purpose. The substance of mountains is daily diminishing; and rocks,—those silent historians of the past,—gradually crumble into atoms, and unperceived are borne off to a new resting place in the sea.

To recapitulate: we find the order of strata of the earth's crust, to be as follows:

Modern—formation.		
Tertiary	Pliocene,	
	Miocene,	
	Eocene.	
Secondary	Chalk with flints,	*Cretaceous System.*
	Chalk without flints,	
	Chalk Marl,	
	Green Sands,	
	Wealden -	*System*
	Oolitic - -	*System*
	Liassic -	*System*
	Upper new red Sandstone, or Triassic	*System*
	Lower new red Sandstone, or Peruvian	*System*
	Carboniferous -	*System*
	Old red Sandstone.	
Transition	Devonian -	*System*
	Silurian - -	*System*
	Cambrian -	*System*
Metamorphic	Argillaceous Schist,	
	Mica Schist,	
	Gneiss.	
Plutonic Rocks—GRANITE.		

ANTHRACITE FORMATION OF PENNSYLVANIA.

Locality.—The Anthracite Formation of Pennsylvania lies in the Counties of Schuylkill, Dauphin, Lebanon, Carbon, Northumberland, Columbia, and Luzerne, in the middle part of the Eastern portion of the State. It is watered by the Susquehanna, Schuylkill, and Lehigh rivers, and their numerous tributary branches.

Extent.—The Anthracite Formation of Pennsylvania may be divided into three grand divisions, or large Coal Regions; the first, or most Southern division, being known as the South Anthracite Region; the second division called the Middle Anthracite Region, and the third grand division is known as the North Anthracite Region, or Wyoming Coal-field.

The three great Anthracite Regions may be again divided into Coal districts, as follows, viz.: The Coal districts contained in the South Anthracite Region, commencing at its eastern end, and continuing thence westward, are the Lehigh, Tamaqua, Tuscarora, Schuylkill Valley, Pottsville, Minersville, Swatara, and the Lykens' Valley and Dauphin,—the Lykens' Valley being the North fork, and the Dauphin the South fork of the western extension of the South Anthracite Region.*

The Middle Anthracite Region, commencing at the western end, and continuing thence eastward, has the Shamokin, Mahanoy, Girardsville, and Quaquake Coad districts; together with the small detached Coal basins contiguous to the Lehigh river, as the Beaver Meadow, Hazleton, Black Creek, Sandy Creek, and others of still smaller area.

The North Anthracite Region, commencing west and continuing thence north-eastward, has the Shickshinny, Wilkesbarre, Newport, Pittston, Lackawanna, and Carbondale Coal districts.

The South Anthracite Region extends in length from its eastern point-like end, near the Lehigh, to its western terminus near the Susquehanna—a distance of about seventy-five miles. The greatest breadth, including

* See Map accompanying this work.

the Coal formation on Broad mountain, is about six miles. This measurement is across the widest and central portion of the Region, and will only hold good for a short distance. The average width of Coal ground of the South Anthracite Region is not more than two miles.

The Middle Anthracite Region, with the detached Coal basins at its eastern part, on the Lehigh, extends in length to its point-like terminus at its western end, which point is about seven miles East from the river Susquehanna—a distance of about fifty miles. The greatest breadth is nearly four miles, Thus, the Middle will average more Coal ground than the South Anthracite Region.

The North Anthracite Region extends from its north-eastern end, on the head waters of Lackawana Creek, to its western point at Shickshinny, on the North branch of the Susquehanna, a distance of upwards of sixty miles. This will not average so great a width of coal ground as either of the other two great Regions.

Within the limits of the three great Anthracite Regions, are ridges and spaces composed of conglomerate, red shale, and sand stone strata, which lie between, and separate from each other the several coal basins of each of the three great divisions. In this stratification no Coal exists. The value of the land which contains the coal is calculated by taking into consideration the number, thickness, character, and quality of the veins of mineral in each particular place, and from their adaptation for mining to advantage, and their accessibility to market.

Geological Character of the Anthracite Formation.—We are indebted to Wm. F. Roberts, Esq. the well-known practical Geologist and Mining-Engineer, for the following concise description of the geological structure of the Anthracite Formations of Pennsylvania. The statement was prepared expressly for this work, and may be relied upon as strictly authentic:

—The Anthracite Formation of Pennsylvania, as regards its Geological character, especially in the South Region, is very much distorted, and the Coal veins are much disturbed, and irregular in their courses. In working the mines *faults*, both of a hard and soft nature, or, in other words, rock and slate, (or what is not inappropriately named *dirt faults*, some of which are of great magnitude) are frequently met with, which not only prove a great loss to the owners of the properties in which they occur, by diminishing the quantity of Coal: but they are a serious inconvenience to the prosecution of the mine, and a great drawback upon the profits of the Operators and lessees of the Colliery—sometimes occasioning the abandonment of the work altogether.

In the Middle Anthracite Region,—taking as an index the mines in operation, the explorations already made, and the general kind appearance of the rocks, and great regularity of the surface,—it is presumed that "faults" will not be found to exist as in the South Region. Indeed, the whole Geological character of the Middle Anthracite Region,—the general order and range of the stratification being so uniform and undisturbed,—goes far to prove that no *fault* of any magnitude will be found within its limits. The mountains are very high, the Coal veins, especially those of the bottom part of the series, are generally very thick, and crop out high up the mountain sides; therefore an inexhaustible amount of Coal, of the very best quality, may be truly and safely calculated upon as existing in this Coal Region.

In the North Region the general character of the strata is undulating, and comparatively flat to what it is found in the South or Middle Regions. The Coal veins, which are those of the bottom part of the formation, are generally of great thickness, and of good quality,—but in quantity there is not that average amount per acre of coal as is found in the other great Regions. This may be accounted for from the slightly undulating arrangement of the strata, and from the waters of the North Branch of the Susquehanna River, which flow through the central part of the Coal Valley, having changed its course from time to time, and swept or washed away much of the Coal,—leaving in places sand and gravel banks that cover considerable area of surface. The great Wyoming flats indicate the change which has taken place in the course of the River.

The basis of the Anthracite formation of Pennsylvania is a conglomerate rock, consisting of white quartz pebbles of various sizes, imbedded in a strong siliceous cement; underneath the conglomerate is a thick mass of red shale and sandstone strata, which completely encircles, in a continuous mountain chain, the three great Anthracite Regions of the state.

The conglomerate, where the measures are perpendicular, forms high massive walls of rock on the summit of the mountains which bound the Coal Regions, and divide the Coal basins; and it is of such a durable, undecomposing nature, that in some places where the strata is on edge, it rises a natural wall twenty to thirty feet in height above the level of the crest of the mountain, and not more than from two to three feet in thickness from the base up. In other places it lies *en masse* in immense blocks, covered with a variety of moss—giving it an imposing, extraordinary rough, and romantic appearance.

As the Coal measures—from their highly inclined angle of dip, which are in some places in the mountain that forms the South boundary of the South Anthracite Coal Region, overtilted—pass to a lesser angle of inclination, which gradually decreases in proceeding northward over the three great Anthracite Regions—the conglomerate becomes more thin and less abrupt in its character; and, indeed, its situation is at times only marked by the loose detached white pebble stones scattered over the surface of the ground, the cement which binds the parts together being in some situations of a more decomposing quality than it is at other places.

The red shale, by exposure to the air, and by the action of water, decomposes very freely, and is the great reason why the general character of the mountains which form the boundaries of the Coal Regions are so steep as they are found to be where streams of any size run along their base;—while the conglomerate on their summits remains undisturbed, a rock of ages until the red shale, on which it reposes, crumbles away, and thus these immense rocks are hurled from their elevated natural position into the vallies below,—and thus are immense boulders of the conglomerate carried away from their native beds to great distances.

The South Anthracite Region contains several elongated synclinal and auticlinal axis of stratification. The general order of the Coal veins range parallel with the mountain chains that bound the sides of the troughs or basins, which is in an East and West direction —the general *dip* of the veins being North and South.

The first or South axis or trough of Coal strata, of the South Anthracite Region, is bounded by Sharp mountain on the South, and by a range of hils, parallel with Sharp mountain, on the North. This axis is in shape like a *canoe*, its greatest width being about the town of Pottsville, which, in that place, is something over half a mile. The eastern terminus of this axis is a short distance south-east of Middleport. The western terminus is near the Susquehanna. Its continuation westward forms the southern fork of Coal strata in Dauphin district. The extreme length of this axis is about fifty miles. At each terminus of this axis or trough of Coal strata, the bottom veins end in a point, and are considerably elevated above the place of the same veins in the central part.

In the commencement of mining operations in Schuylkill County, and indeed down to the present time, it has been considered by many persons who profess a knowledge of these matters, that the range of Coal veins in Sharp mountain, which are what is termed *overtilted* from the perpendicular, are not identical with those veins worked on the opposite side of this narrow trough or synclinal axis—*i. e.* they are not the uprising to the South of the Coal veins worked in the range of hills on the North side of the trough, and which dip to the South, and the sections hitherto made and published tends to show that the veins on the North side the axis are not connected with those of Sharp mountain. It is true that the Coal veins of both sides of this synclinal axis dip in the same direction to the South—those of Sharp mountain on the South side the axis at an angle of about 80° to 85°, and those on the hills on the North side the axis, at an angle of 45° to 50°, and 60°,—yet there is ample evidence to prove the fact that the South and North ranges *connect with each other* and will be found to basin beneath the surface in the valley.

In an excavation at Pottsville, made in the centre of the two ranges of Coal strata of the first or South synclinal axis, is developed the curvature of the axis,—the stratification of rock overlaying the upper vein of Coal is regularly continued and unbroken from one side of the range to the other, and at the extreme ends of this elongated trough, from the bottom veins of Coal being highly elevated, and their dip thereby considerably decreased, they show the axis to be perfect throughout, and the South and North ranges identical and connected with each other. Thus we have at the extreme ends of the first synclinal axis, the bottom, and in the centre of it, the top of the stratification of which it is composed, in a perfect and regular basin-like and synclinal order—clearly connecting the Coal veins which are found in Sharp mountain, the South side of the axis, with those in the small range of hills, the North side of the axis.

In his description of the Sharp mountain range of Coal strata, our State Geologist and myself* do not agree, and it may not be out of place here to give his remarks thereon in full, with the reason why my opinion and his are at variance with each other, as to this particular part of the Coal formation.

Professor H. D. Rogers, in his second annual Report on the Geological exploration of the State of Pennsylvania, p. 30, says: "By far the most conspicuous North and South disruption of the Coal measures and their southern conglomerate barrier, is displayed in an enormous dislocation of the entire chain of the Sharp mountain, about nine miles east of Pottsville, by which the whole mass of the mountain on the eastern side of the break, has been moved northward, through at least one-fourth of a mile, throwing, of course, all the Coal seams far out of their regular position." From a careful examination of the place referred to by Professor Rogers, as above, I find that no evidence is shown that the Coal measures of Sharp mountain have been moved northward, or in any way displaced; but, on the contrary, a uniform regularity is maintained in this part of the Coal Region. The Sharp mountain, it is true, is not continued eastward further than the place referred to, for the reason that the Coal measures of the first synclinal axis of the South Anthracite Region having terminated there. The Coal veins of this axis, as I before observed, are gradually elevated as they approach this point, one vein basins out after another, until the last or bottom vein of the axis runs out on the table land at the end of the mountain, bounded by the conglomerate.—The red shale at the termination of the axis, from its soft decomposing nature, form an abrupt declivity occasioned by the streams which flow down its sides into the valley below—and this is the "conspicuous North and South disruption" of Mr. Rogers. Further North than the termination of the first axis, another mountain (not Sharp mountain,) bounds the South side of the second axis of Coal strata of the South Anthracite Region.

The second synclinal axis lies between the range of hills before named, and a range further North, which, in the vicinity of Pottsville,

* Wm. F. Roberts, Esq. Geologist and Mining Engineer, Danville, Pa.

is called Peach mountain. The Coal veins of the Peach mountain range are very much contorted in their disposition, having several undulations or axis of a minor synclinal and anticlinal character. In the more elevated land along the range of Peach mountain, the curvatures of the Coal veins are more duplicated than they are in the low parts of this mountain range. A better development of this peculiar Coal formation may be seen in the lands north-east of Middleport, where the curvatures of the strata are more numerous, and exposed by actual workings, than may be found in any other position along the entire range.

The uprising of the Coal veins at this place forms several synclinal and anticlinal axis—the lower veins curve over before they reach the surface, and the upper ones lie over them in an uniform way. In some places, where denudation has taken place, the continuity of the saddle, or anticlinal curve of the upper veins, is washed off, and the same veins form several north and south dips, which, previous to the nature of the formation having been clearly understood, were taken for so many different and distinct veins of Coal. This misconstruction of the true Geological character of the veins, and the reason why so many outcrops are exposed, being not considered: led to a great many errors in the estimation of the real value of the Coal land in the Peach mountain range, as regarded the quantity of mineral contained therein. In many other places, too, in the Anthracite formation, the same causes have, and do even at the present time lead to similar results, and is the reason why erroneous calculations are not unfrequently made.

The extreme length of the axis of Peach mountain Coal strata is about thirty-five miles. The eastern terminus of the synclinal axis is at the Old Summit Coal Mines on the Lehigh estate. This, the second axis, extends further east than the first axis a distance of about eleven miles. The western extreme point of the second synclinal axis is about twenty-five miles East from the western end of the South fork of Coal strata in Dauphin district, and about fourteen miles East from the western end of the North fork of Coal strata in Lykens' Valley district. The point of termination of the second axis is where the two before named forks begin to diverge in their westward prolongation from their course eastward. The terminus is seven miles north-west from Pinegrove. In the continuation of the axis of Peach mountain Coal strata, the undulations that are found in its central part, do not continue through its entire length, at its eastern and western parts—as the bottom Coal veins of the axis become more elevated, the curvatures of the strata are diminished.

The third cynclinal axis is between Peach mountain and Mine Hill, and extends from the point-like terminus of the South Anthracite Region, near the Lehigh river, to a similar terminus, the end of the North fork in the Lykens' Valley district,—a distance of about fifteen miles. In this axis undulations and curvatures of the Coal strata are found, but not of that frequent occurrence as in the Peach mountain range. These undulations may be seen at Rhume Run, in the Lehigh district; on Silver Creek, in Schuylkill Valley district, (North of Pinegrove,) and in the Lykens' Valley district.

The fourth synclinal axis of Coal strata is known as the Broad Mountain Coal basin, which lies between Mine Hill and Broad Mountain; its eastern end is between the head waters of Wolf Creek and Silver Creek; its western end is West of "Woolaston's" or Raulin's Tavern. The length of this axis is about eleven miles.

The fifth synclinal axis of Coal strata is on the summit of Broad Mountain; its eastern end is East of New Boston Colliery; its western end, West of Raulin's Run. The length of this axis is about fourteen miles. The axis is narrow, and the Coal is in places washed off—therefore it is not so valuable in point of quantity of Coal as it would be were the veins continuous through it.

—The foregoing axis of Coal strata constitute the South Anthracite Region—the first grand division of the Anthracite formation of Pennsylvania.

The Middle Anthracite Region contains as well as the elongated synclinal and anticlinal axis of Coal strata, several small and detached Coal basins.

Between Mahanoy Mountain, the South boundary of the Middle Anthracite Region and the mountain ranging parallel thereto, and next North, known as Locust Mountain, are three synclinal and two anticlinal axis of Coal strata. The valley containing these axis is about twenty-six miles in length. The eastern termination of the axis is about eleven miles each from Girardsville, near the head waters of the Mahanoy and source of the tributaries of the Little Schuylkill. The western termination is South of Shamokin. Both terminations of this axis break off in a similar manner to the eastern termination of the first axis, in the South Anthracite Region. Locust mountain is the North boundary of the Mahanoy, and the South boundary of Shamokin Coal valley. The North boundary of Shamokin Coal valley is Big mountain. In the Shamokin Coal valley, taking its central part as a section, there are four synclinal and three anticlinal axis of Coal strata, besides a roll of the outcrops of the lower veins of Coal shown on the North slope of Locust Mountain. The first synclinal axis of the Shamokin Coal Valley is between Locust Mountain and Mount Carmel Ridge; the second between Mount Carmel Ridge and Mine Ridge; the third between Mine Ridge and Coal Run Ridge; the fourth between Coal Run Ridge and Big Mountain.

The anticlinal axis are Mount Carmel, Mine Ridge and Coal Run Ridge.

The most complete and beautiful development of the Coal strata of the Anthracite formation of Pennsylvania, is the anticlinal axis of Mount Carmel Ridge, developed by the North Branch of Shamokin Creek. The

creek passes through the axis at a right angle to the run of the coal strata, about five hundred yards west from the centre turnpike at Mount Carmel,*—the arch of sandstone rock is cut down perpendicular, forming a beautiful curve, and giving an admirable illustration of the regularity and perfection of this part of the Coal field. The anticlinal axis of Mine Ridge is likewise cut by the same stream, and affords another example of the perfection of the Coal strata of the Shamokin Coal Valley. Mine Ridge, from the Centre Turnpike, gradually rises into a hill of great elevation eastward, where coal veins of great thickness and extraordinary pure quality are opened—a strong evidence that the ridge or axis of Coal strata, when thoroughly developed, will prove to contain mineral in quantity and quality inferior to no other place in the Anthracite formation of Pennsylvania.

Big Mountains contains the bottom series of Coal veins which crop out along its summit. These veins are the same as those developed in Locust Mountain, the thickest veins of the Anthracite formation.

The Shamokin Coal Valley extends in length from its eastern terminus, on the head waters of Little Schuylkill and Quaquake Creeks, to its western terminus within about seven miles from the Susquehanna—a distance of about forty miles.

The eastern terminus of the Shamokin Coal Valley has two forks of Coal strata, similar to the forks of the western terminus of the South Anthracite Region, but much smaller in point of length and width.

North of these forks are the detached Coal basins of Beaver Meadow, Dreck Creek, Hazleton, Black Creek, Little Black Creek, Sandy Creek, and Hell Kitchen, extending one after the other northward to the Nescopeck mountain. The Nescopeck summit is conglomerate, the base of the Coal formation; and from it to the Wyoming Coal field, traces of the Coal formation are found—a sufficient evidence that the three great divisions of the Anthracite formation of Pennsylvania were, in former times, a connected and continuous formation of Coal strata.

Whatever changes have taken places since the deposition of the Coal strata, I am of opinion have been gradual. I have examined in different places where disruptions and dislocations have been represented to have taken place, and as far as I can see, nothing in these places of an extraordinary nature exists—at least so far as regards a momentary or violent force having been exerted, to have materially, at any one time, altered the general order and arrangement of the strata.

The South Anthracite Region contains white, red, and grey ash Coal veins. The white ash are found in the Lehigh part of the Region, in the basins of Broad mountain, and in the Mine Hill. The principal grey ash are in the Peach mountain range, and the principal red ash Coal are the South dipping veins of the first synclinal axis. The South fork in Dauphin District has, in its eastern end, a semi-bituminous Coal, which gradually changes, going westward, into a pure bituminous. A similar graduated change from an Anthracite to a Bituminous Coal is found in the Coal formation of Wales, in Great Britain, and according to Professor Muchison, in several Coal fields in Russia the Coal veins which are Bituminous at one part of the basin, become Anthracite at the other. Lykens' Valley district yields Coal of a semi-Bituminous or free burning quality. Argillaceous Iron Ore, both nodular and in seams, is found varying with the Coal veins in places through the Coal Region, and Black Band or Carboniferous Iron-stone is found in the Lykens' Valley district.

In the Middle Anthracite Region is found white, gray and red ash Coal veins. In Big mountain a superior vein of red ash Coal, seven feet in thickness, which burns very freely and leaves no clinker, is opened with white ash coal veins above and below it. Red ash Coal veins are found in other localities in this Coal Region. Argillaceous Iron ore in the nodular form, and in regular strata, appears to be in abundance through this Coal Region; and Bog Ore exists in large beds in various places. Carboniferous Iron-stone is likewise found in this Region, and may ultimately become an article of great value for smelting purposes.

THE BITUMINOUS FORMATION

OF PENNSYLVANIA.*

Nature, in the disposition of her bounties, seems to have bestowed upon Pennsylvania more than a due proportion of the treasures of the mineral kingdom. Great and valuable as are her Anthracite deposites, and rich and abundant as are her mines of iron ore and other minerals, the Bituminous Coal Region is still more extensive and inexhaustible.

The great secondary deposit, extending, as it is generally believed, from the Hudson to the Mississippi, and to the Rocky Mountains; is in Pennsylvania limited by the Alleghany mountain, which appears to form the barrier or dividing line between the Anthracite and Bituminous Coal beds. The union or junction of these formations is plainly and distinctly marked in the ends of the mountain where the West Branch of the Susquehanna breaks through it, above Bald Eagle, the latter resting against the former, and forming the basin in which the Bituminous Coal, in irregular and successive strata, is deposited. This Coal field is, therefore, confined to the West side of the Allegany, and is supposed to extend to the centre of the mountain. In the South-east corner of Somerset county, and in the western part of Bradford and Huntingdon counties, it is found to extend to the South-east of what is locally called the Allegany, and occurs in great abundance on Will's creek, Jenning's creek, Gladwin's creek, &c. emptying into the Potomac. The chain of moun-

* A new town just erected, not laid down in the map.

*Abridged from Packer's Report to the Legislature of Pennsylvania—1834.

tains called the Allegany, above Bedford, is very wide, and large mountains diverge from it; and although the mountain running through Somerset, and dividing the waters of Youghiogeny and Conemaugh from those of the Potomac, may be the largest: it seems most probable that Well's, or Evett's, or possibly Sideling mountain, there forms the boundary of that deposit, and, upon examination, will be found to exhibit a continuation of the same characteristic feature between the secondary and transition formations.

The Bituminous Coal fields vary from one foot to twelve feet in thickness, but rarely exceed six feet. They lie in nearly horizontal strata, with about sufficient dip to free the mines from water. Some hills contain three and four beds, with alternate layers of earth and slate, and rest between a smooth slate roof and floor. *Faults* are seldom met with; and in this respect they materially differ from the Anthracite. Mr. Packer thinks this fact goes far to sustain the opinion that all this vast extent of secondary rocks was once the bottom of a great lake or sea, and that it suffered little, if any interruption from the gradual discharge of its waters through its distant and widely extended boundary. It has evidently been drained by the Mississippi, the St. Lawrence, the Susquehanna, and the Hudson; and it is a curious and interesting fact, that near the northern termination of this Coal field in Potter county, the head waters of the Allegany, the Susquehanna and the Genesee rivers, flowing into the gulf of Mexico, the Chesapeake and the St. Lawrence take their rise in an area or space of about five miles.

With the exception of the Susquehanna and its tributaries, and Will's creek emptying into the Potomac, all the streams rising in the Coal field, West of the mountain, flow into the lakes, or into the Ohio river; and consequently the ground falls off, or recedes in the same direction, and becomes too low, as it is generally supposed, to contain the Coal measures. Its northern termination or boundary may be traced from the head waters of Towanda creek, in Bradford county; thence across the high-lands or dividing waters of Tioga, Potter, M'Kean, Warren, Venango, &c. to the Ohio State line. The Tioga river and its tributaries penetrate the Coal field in the vicinity of Blossburg and Wellsborough, in Tioga county. An interesting minerological report upon this Region has been made by R. C. Taylor, Esq. (author of the valuable *Statistics of Coal*—just published;) for the Blossburg road company, in which is satisfactorily shown that the Coal runs out as the streams decline in the North. There would need,—says Mr. T.—a total height of mountain of five thousand one hundred and twenty-five feet at the State line, between New-York and Pennsylvania, to contain the Coal measures; whereas, the hills there are probably between six and seven hundred feet altitude. This calculation was entered into with a view of showing the futility of the expectation, not uncommonly expressed some time ago, of tracing these Coal beds to a northerly direction beyond the limits at which they are at present discoverable.

This field, being bounded on the South by the Allegany mountain, extending into the State of Virginia, and westward, Coal may be said to be present, to a greater or less extent in all the western Counties, with the exception of the County of Erie, in which it has not yet been discovered. The Counties of Bradford, Lycoming, Tioga, Potter, M'Kean, Warren, Crawford, Bedford, Huntingdon, and Centre, lie partly in and partly out of the Coal field. The Counties of Allegany, Armstrong, Beaver, Butler, Cambria, Clearfield, Fayette, Greene, Indiana, Jefferson, Mercer, Somerset, Venango, Washington, and Westmoreland are wholly within its range, and embrace together an area of about twenty-one thousand square miles, or 3,440,000 acres.

The West branch of the Susquehanna, taking its rise in Cambria and Jefferson Counties, passes through the heart of the rich Coal deposites of Clearfield County, and breaks through the Allegany mountain above the mouth of Bald Eagle, thus affording an outlet to the eastern markets for the Coal of that Region. It is navigable for arks from the Cherry Tree, or mouth of Chest creek, in Clearfield County, and one hundred and twenty-five miles above the present termination of the Pennsylvania canal, at Dunnstown, Pine creek, and Lycoming creek, have also their source in the Coal field, and afford outlets for the Coal to the Susquehanna, and to these three points we must look, mainly, for our eastern supplies of Bituminous Coal.

HISTORY

OF THE

INTRODUCTION OF MINERAL COAL

IN PENNSYLVANIA, &c. &c.

In entering upon a brief history, as we now propose to do, of the introduction of mineral Coal to the practical purposes of life, we feel almost overwhelmed at the importance and grandeur which the trade has attained. Referring back but a few years, its existence seems to have been altogether unknown; a few years later, the discovery of its hidden recesses in the mountains, where it had rested undisturbed for countless ages, filled the public mind with a fevered excitement, and gave rise to a spirit of speculation bordering, in fact, to a species of infatuation. A calm—a solemn pause terminated this period; and now, after a few years of sob[illegible] enterprise has been active, and we find the young Coal Trade, "as if born to command," intimately allied with all the great interests of our country, and its existence and prosperity as absolutely necessary as the bread whereof we eat.

In proceeding on our present mission, therefore, the first inquiry which suggests itself is, as to the nature and properties of Coal. Although its vegetable origin is well understood, it is a substance of exceedingly fixed, and, perhaps, the most refractory in nature. It is capable of decomposing sulphuric acid, and separates the sulphur; added to nitrous acid, it inflames it; or to metallic earths, it reduces them to *metals*. But in these processes, the assistance of *red heat* is required. In every instance but those mentioned, Coal seems to be a perfectly unalterable compound, viz. of burning in the open air, and separating oxygen from other bodies;—for it may be exposed in close vessels to the most intense and long continued fire, without suffering the least decomposition of its parts. No disposition to fuse, nor any diminution of weight, can be perceived. It resists the action of the most powerful menstrua or liquor—liver of sulphur alone excepted.

Relating to the first introduction of Coal in the old world, we have but limited accounts based, too, on doubtful authorities. Some writers date its use in England as far back as the tenth century. As early as 1278, however, Coal was dug and used to some extent; but it does not appear to have gained much importance until one or two centuries afterwards. In the early part of the seventeenth century, it was first applied to the smelting of iron—previously to which charcoal was exclusively used. The first patent issued for foundling iron with Coal, was granted to Simon Startwort, in the year 1622, whereby he obtained for thirty years the sole right for the whole Kingdom. He, however, did not succeed in business, and in a short time afterwards his patent was abandoned. In 1750 there were only three hundred furnaces in England, yielding about 75,000 tons of metal annually. After the successful application of Coal, this quantity was nearly quadrupled the first year; and about the period that Watt & Bolton's double-pressure steam-engine was brought into use, by which the most important advantages were secured, the product was again greatly increased. From about the year 1796, therefore, the iron-trade of England may be said to have effectually commenced; for from this period up to the present time, the product has annually increased —increased, we might observe, in exact proportion as new facilities for using Coal were, from time to time, introduced.

Throughout Europe a prejudice had, for a long time, prevailed against the use of Coal for domestic purposes. In Paris its use as a household fuel commenced at about the middle of the sixteenth century; and in Scotland and Wales, as also in Belgium and some other countries, it was introduced about the same time, if not somewhat anteriorly.

—Deposits of Coal have been found in various parts of the United States, and they may be said to form the chief sources of our National wealth, since every branch of Manufactures, Commerce, and Business are inter- ... in their product. Allusion was made ... of these deposites as early as in 1670, ... of the explorers and early settlers of the c... in papers which they have left behind.

The Coal i... valley of Wyoming was known, a... experiments made to use it, long befo... the ...jacent, or other regions in the ... Sta... d been explored. In the years ...77... several ark loads of Coal were take... the Susquehanna river, and hauled to ... United States Armory at Carlisle, for the manufacture of fire-arms. This Coal, as we ... from the Report of Mr. Packer, was obta... from land belonging to the late Judge Hol... one mile above Wilkesbarre, and near ... mouth of the mill-stream. The same bed w... opened about twenty years ago, at the ... pointed out by the Judge in his life-time, ... upon removing the overlaying earth, ... marks of tools were plainly perceptible in the Coal seam. In 1768, it is said, this Coal was first used by an ingenius blacksmith, named Obadiah Gore, a settler from Connecticut; and having fully succeeded in applying it to his business, it soon became the only fuel employed by the blacksmiths in the valley. It was first used in a grate by Judge Fell, of Wilkesbarre, in the year 1808, who, to use his words, conceived the idea that, if a body of this Coal were ignited, and confined together, it would burn as a fuel; and to try the experiment, he had a grate erected for the purpose, about eight inches in depth, and twenty-two inches long, and the Coal, after being ignited in it, burned beyond the most sanguine expectation.

Bituminous Coal has been used in Pennsylvania for many years past. From the settlement of Clearfield county to the present period, Coal has been brought down the Susquehanna in arks, and sold in small parcels at the different towns along the river, in Lycoming, Northumberland, Union, Dauphin, Cumberland, York, and Lancaster counties, for the supply of the blacksmiths, who always prefered it, for most purposes, to charcoal. The late Samuel Boyd, of Lancaster county, was among the first who conceived the idea of furnishing Coal to the eastern market, and as early as 1785, took up and patented in the then new purchase from the Indians, a tract of land lying on the margin of the river, about three miles above the present town of Clearfield. There is a hill or steep precipice on this land, jutting into the river, containing several successive strata of Coal, which can be shovelled out of the mines into the ark. This could be done, also, in many other places along the banks of the river. His son, William Boyd, in the year 1803, visited the spot, and procured an ark-load of the Coal, which he sent down the Susquehanna by the Spring freshets of the following year, to the town of Columbia, in the county of Lancaster—a distance of two hundred and sixty miles. This, therefore, was the first ark-load of Coal that passed through the Conewago falls to Columbia. About the same time, John Jordan, of Clearfield, sent down an ark-load of Coal, taken from a bed forming the bottom of the river, about a mile above Clearfield. From that time until within a very recent period, (if, in fact, the trade has suffered any diminution at all,) the business of shipping coal down the Susquehanna, in connection with lumber, has been followed by many of the inhabitants of Clearfield county, as a regular means of subsistence.

In the winter season, they do little else than cut down timber, which is no sooner prepared into lumber, than it is converted into rafts and arks;—the latter of which being generally loaded with Coal—and then, awaiting a fovorable stage of water in the Spring, they will launch forth on the voyage to market.

In 1813, Philip Karthaus erected a colliery at the mouth of Little Mushannon creek, and embarked in the mining business somewhat extensively. A few years after, he succeeded in taking a quantity of Coal to Philadelphia, having conveyed it in arks to Port de Posit, the terminus of the Susquehanna, and from thence ... sloop through the Chesapeake and Delaware Canal. This was the first ark-load of Bituminous Coal taken to that city from the Susquehanna, and it was readily sold at thirty-three cents per bushel. Mr. Karthaus also took a quantity of Coal to Baltimore, where, after having undergone due tests, it was pronounced to combine all the properties of the best Bituminous Coal—producing the finest coke, as well as hydrogen gas.

—The discovery of Coal in the Lehigh district is said to have been purely accidental. There had been legends of long standing, supposed to have emanated from the Indians, that Coal abounded in this section of Pennsylvania; and among some of the credulous german farmers in Lehigh, Berks, Lancaster, &c. one is occasionally reminded of them, and grave intimations thrown out that Coal is reposing in "certain places" beneath the luxuriant soil of those counties. Such traditionary reports prevailed for a long time among the early settlers of the territory now comprising the several counties of the Anthracite Regions, and if similar reports in the counties above named should ever be realized in the same happy manner, all will unite in admiration of the german-stoicism with which they are still maintained by the "older inhabitants." The story of its discovery near Mauch Chunk, in the present county of Carbon, is doubtless already familiar to many. Nevertheless, it is so curious and romantic in itself, and is fraught with such miraculous results upon the physical and mental condition of mankind, that we could scarcely excuse ourself were we to omit it here. The account was given by the late venerable Dr. James, of Philadelphia, who, in the year 1804, in company with Anthony Morris, Esq. of the same city, visited some lands held jointly by them, near Sharp mountain.

In the course of our pilgrimage—saith the account,—we reached the summit of Mauch Chunk mountain, the present site of the mines or rather quarry of Anthracite Coal. At the time there were only to be seen three or four small pits, which had made the appearance of the commencement of rude wells, into one of which our guide,—Philip Ginter, descended with great ease, and threw up—some pieces of coal for our examination. After which, whilst we lingered on the spot, contemplating the wildness of the scene, honest Philip amused us with the following narrative of the original discovery of this most valuable of minerals, now promising, from its general diffusion, so much of wealth and comfort to a great portion of Pennsylvania.

He said, that when he first took up his residence in that district of country, he built himself a rough cabin in the forest, and supported his family by the proceeds of his rifle; being literally a hunter of the Backwoods. The game he shot, including bear and deer, he carried to the nearest store, and exchanged for other necessaries of life. But at this particular time to which he then alluded, he was without a supply of food for his family; and after being out all day with his gun in quest of it, he was returning, towards evening, over the Mauch Chunk Mountain, entirely unsuccessful and disappointed; a drizzling rain beginning to fall, and night rapidly approaching, he bent his course homeward, considering himself one of the most *forsaken* of human beings. As he trod slowly over the ground, his foot stumbled against something which, by the stroke, was driven before him; observing it to be black, to distinguish which there was just light enough remaining, he took it up, and as he had often listened to the traditions of the country of the existence of Coal in the vicinity, it occurred to him that this might be a portion of that *Stone-Coal*, of which he had heard. He accordingly carefully took it with him to the cabin, and the next day carried it to Colonel Jacob Weiss, residing at what was then known by the name of Fort Allen—(erected under the auspices of Dr. Franklin.) The Colonel, who was alive to the subject, brought the specimen with him to Philadelphia, and submitted it to the inspection of John Nicholson and Michael Hillegas, Esqs., and also to Charles Cist, a printer, who ascertained its nature and qualities, and authorized the Colonel to pay Ginter for his discovery, upon his pointing out the precise spot where he found the Coal. This was readily done by acceding to Ginter's proposal of getting through the regular forms of the patent-office, the title for a small tract of land, which he supposed had never been taken up, comprising the mill-seat, on which he afterwards built the mill which afforded us the lodging of the preceding night, and which he afterwards was unhappily deprived of by the claim of a prior survey.

Cist, Weiss, Hillegas, and others, immediately after (about the beginning of the year 1792,) formed the Lehigh Coal Company, but without a charter of incorporation, and took up between eight and ten thousand acres of unlocated land, including the Mauch Chunk Mountain.

The mine now wrought was opened by this Company, but the difficulties of transporting the Coal to market were then insurmountable, and their enterprize was shortly abandoned. This mine remained in a neglected state, used only by the smiths and others of the immediate vicinity, until the year 1807, when William Turnbull caused an ark to be constructed at Lousane, which carried to Philadelphia two or three hundred bushels. A portion was sold to the manager of the water works, for the use of the steam-engine. Upon trial, however, it was deemed rather an extinguisher than an aliment of fire; was rejected as perfectly worthless, and was soon broken up and spread on the walks of the surrounding garden, in the place of gravel.

The legislature, early aware of the importance of the navigation of the Lehigh, passed an act for its improvement in 1771, and others in 1791, '94, '98, 1810, '14 and '16. Under one of these a company associated, and after expending more than 20,000 dollars in clearing out channels, relinquished their design of perfecting the navigation of the river.

In the meanwhile the Coal mine company, desirous to render their property available, granted leases to several individuals successively; the last, for a term of ten years, with the privilege of cutting timber from their lands, for floating the Coal to market, was made to Messrs. Cist, Miner & Robinson, upon the condition that they should send to Philadelphia 10,000 bushels of Coal per annum, for the benefit of the lessees. These gentlemen loaded several arks with Coal, only three of which reached the city, and they abandoned the business at the close of the war in 1815.*

During the war, Virginia Coal became very scarce, and Messrs. White & Erskine Hazard, then engaged in the manufacture of iron wire, at the Falls of the Schuylkill, having learned that Mr. J. Malin had succeeded in the use of the Lehigh Coal at his rolling mill, procured a cart load of it, which cost them a dollar per bushel. This quantity was entirely wasted, without getting up the requisite heat. Another cart load was, however, obtained, and a whold night was spent in endeavoring to make a fire in the furnace, when the hands shut the furnace door, and departed from the mill in despair. Fortunately, one of them, who had left his jacket in the mill, returning for it in about half an hour, observed the door of the furnace to be red hot, and upon opening it, was surprised to find the interior at a glowing white heat. The other hands were summoned, and four separate parcels of iron were heated by the same fire, and rolled before renewal. The furnace was then replenished, and as *letting the fire alone* had succeeded so well, that method was tried again with a like result.

Thenceforth Messrs. White & Hazard con-

* Abridged from the Gazetteer of Pennsylvania—1834.

tinued the use of Anthracite Coal, which they procured from Schuylkill county, in wagons, and occasionally in flats by freshets, and also from Lehigh, in one of Messrs. Miner & Co.'s arks. Thus instructed in the invaluable properties of Anthracite, Messrs. White & Hazard having disposed of their works on the Schuylkill to the city of Philadelphia, turned their attention to the mines of the Lehigh, with a resolution of creating adequate means for transporting their wealth to market.

In January, 1818, they jointly, with Mr. Hants, obtained the control of the lands of the Lehigh Coal mine company. In the succeeding March, the legislature granted to these gentlemen ample power for improving the navigation of the river Lehigh, and vested in them, their heirs and assigns, the absolute and exclusive use of the waters of the river, not incompatible with the navigation, and the right to levy tolls upon boats, rafts, &c., *descending* the river, and also upon ascending it, in case a slack water navigation should be made, upon condition: 1st. That they made a descending navigation within six years, from the mouth of the Nesquehoning creek to the Delaware, and from the Great Falls to the Nesquehoning, within twenty years. 2. That in case the legislature deemed such navigation sufficient, the grantees should convert the same into a complete slack water navigation, erecting one lock or other devices, overcoming at least six feet fall, yearly, until the whole should be completed. 3. That in case of abuse of the privileges granted, or neglect to complete the slack water navigation, within twenty years after requisition made, that the State might resume the grant. 4. That the State might, after the expiration of thirty-six years from the date of the grant, purchase the rights of the grantees to the navigation. And 5th. That upon such purchase, or resumption, in case of forfeiture, that the State should fulfill all the obligations enjoined by the this act, upon the grantees.

For the purpose of obtaining funds to carry this act into effect, and conduct the mining operations advantageously, Messrs. White, Hants & Hazard, formed, with others, two associations, in July, 1818; the one, denominated "The Lehigh Navigation Company," for whose use, they granted to trustees, by deed dated 10th August, 1818, all the right vested in them by the above mentioned act, to the benefits of the river Lehigh, reserving to themselves certain residuary profits and exclusive privileges in the management of the company; the other, denominated "The Lehigh Coal Company," for whose use they also conveyed to trustees, certain estates in sundry tracts of Coal lands, reserving also to themselves certain residuary profits, and exclusive privileges in the management of such company.

The navigation company commenced the improvement of the Lehigh in August, 1818. In 1820, Coal was sent to Philadelphia, by an artificial navigation, and sold at $8 50 per ton delivered at the door of the purchasers.

In the same year, the two companies were amalgamated under the title of *The Lehigh Coal and Navigation Company;* and Messrs. White & Hazard, having in the interim acquired the interest of Mr. Hants, obtained for themselves in the union, the privileges which had been reserved in the original organization of the separate companies.

By an act of assembly passed 13th February, 1832, the Lehigh Coal and Navigation Company was incorporated, and the property of the prior associations, and the privileges created by the act of 1818, were invested in them. Their capital stock was limited to $1,000,000, divided into shares of $50 each; and of this capital, their former property formed part.—They were empowered to commence a slack water navigation upon the Lehigh, within a year from the date of the act. To this company Messrs. W. & H. became parties, as simple stockholders merely.

To faciliate the ascent of the river, the company resolved on a lock navigation, on which steam boats might be employed. Accordingly a lock was built at Mauch Chunk, measuring one hundred and thirty-five feet in length, and thirty in width; and the canal, of more than a mile in length, annexed to it, was excavated five feet deep, and its banks lined with stone. But as the mode was very expensive, and the state had commeneed the Delaware canal from Easton to Bristol, a change in the plan became expedient; and in 1827, the company having increased their funds by the sale of ten thousand shares, the balance of their capital, determined on making a canal navigation, which should correspond with the Delaware canal. This great work, extending from Easton to Mauch Chunk, a distance of forty-six miles and three quarters, consisting of ten miles of pools, and thirty-six miles and three quarters of canals, was commenced in the summer of 1827, and was in condition to authorize the company to exact toll thereon in July, 1829. The canal is five feet deep, forty-five feet wide at the bottom and sixty feet at top; the banks are firm, and lined chiefly with stone; the locks are twenty-two feet wide and one hundred feet long, and are adapted to pass boats, suited to the Delaware canal, in pairs. The ascent of three hundred and sixty-four feet, is overcome by fifty locks and nine dams. The whole of the river improvement, from its commencement, as a descending navigation to its final completion, as above, cost about $1,558,000. The toll houses erected along the canal, are of the most substantial and comfortable kind; and in the completion of this noble work, in the language of a former manager, "there has been no money expended for ornament, though none has been spared to render it sound and permanent."

—In the districts in the neighborhood of Pottsville, Coal was known to exist more than seventy years ago. Repeated searches had, at various periods, been made; but the coal found was so different from any previously known, that it was deemed utterly valueless—more especially as no means could be devised to ignite it (a character which its name

sufficiently indicates). Searches for it were abandoned, at least for a time;—when a blacksmith, by the name of Whetstone, luckily chanced upon some, and immediately undertook to use it in his shop. After experimenting with it for a short time, his efforts proved successful, and his triumph having been duly communicated, in the shape of local gossip, to the citizens of the surrounding neighborhood, attention was very soon after directed to the expediency of instituting further inquiries as to the nature and extent of the deposit, and its applicability for other purposes. Among those who, at a very early period, did not hesitate to declare their belief in the existence of Coal in this district, was the late Judge Cooper; and it was through the influence of such persons that seaches were continued through circumstances and prejudices at once discouraging, and seemingly fool-hardy. Among the first, if they were not the first, who undertook explorations for Coal, were the Messrs. Potts. They made examinations at various points along the old Sunbury road,—but in no instance did success attend them. The late William Morris, soon after the operations of Messrs. Potts were terminated, became proprietor of most of the lands lying at the head of the Schuylkill; and about the year 1800 he was fortunate enough to find Coal, and in the same year took a considerable quantity to Philadelphia. It was in vain that he held forth its peculiar virtues, and vast future importance;—all his efforts to convince the people of its adaptation to use, proved abortive, and when, occasionally, an individual was found who could be induced, through the force of argument and eloquence, to coincide in the merits of "stone-coal," the well-known lines,—

> A man convinced against his *will*,
> Is of the same opinion still,—

would be involuntarily forced upon his mind;—and finally he had no other alternative but to dispose of his lands, and abandon his projects as altogether fruitless.

We do not know that any farther notice had now been taken of this coal, for six or seven years afterwards. Peter Bastons made some discoveries of its deposit, while erecting the Forge in Schuylkill Valley; and a blacksmith, named David Berlin, continued to improve upon the suggestions of Whetstone—(who, by this time, had discontinued business, and perhaps left the vicinity) and imparted his successes freely to others of his craft. But few, however, could be prevailed upon to use them. Prejudice—prejudice was ever keen, and it seemed to keep men of ordinary spirit at a respectful distance. Men of iron nerve could only oppose themselves to the current.

In the latter part of the year 1810, a practical chemist, combining science with practice, made such an analysis of the Coal of this Region, as convinced him that there was inherent in the mass all the properties suitable for combustion. He, therefore, erected a furnace in a small vacant house on Front-street, between Philadelphia and Kensington, to which he applied three strong bellowses. By this means he obtained such an immense *white heat* from the Coal, that platina itself could have been melted! From this experiment was derived such proofs of its qualities as, ultimately, favored its general introduction into that city.

But although it might easily be inferred that such experiments could not fail to have secured for it immediate favor, yet such was by no means the fact. Intelligent men, it is true, calmly deliberated over the subject—but that was all; the time had not yet arrived for them to *act*. Two years after this, the late Colonel George Shoemaker and Nicholas Allen discovered Coal on a piece of land which they had but recently purchased,—in times past, called Centreville—situate about one mile from this Borough (Pottsville.) They raised several wagon-loads of Coal, but no purchaser could be found. Mr. Allen soon became disheartened, and disposed of his interest in the lands to his partner; who, having received some faint encouragement from some citizens of Philadelphia, persevered in his operations. He got out a considerable quantity, and forwarded ten waggon-loads to Philadelphia, in quest of purchasers. Its arrival there was, as usual, greeted with the warmest *prejudice*, and there were few who appeared to evince any curiosity or interest on the subject. Nearly every one considered it a sort of *stone*, and saving that it was a "peculiar stone"—a stone-coal—they would as soon have thought of making fire with any other kind of *stone!* Among all those who examined the Coals, but two persons could be prevailed upon to use them. They each bought a small quantity, "to try it;" and alas! the trials were unsuccessful! The purchasers denounced Colonel Shoemaker as a vile imposter and an arrant cheat! Their denunciations went forth throughout the city, and the Colonel, disappointed and sick at heart, was about leaving the place and abandoning the Coal forever, when he was called on by Messrs. Mellen & Bishop, who took some of the Coal for the purpose of experimenting with it in their rolling mill in Delaware county. These experiments were eminently successful, and the results having been published in the public journals of Philadelphia, the current of prejudice was suddenly thrown back. Experiments were next made at the iron works at the Falls of the Schuylkill, and also at those at Phœnixville,—both of which, we believe, proved successful, and the result was again communicated to the press.

From this time forth, the deeply-seated prejudice of the people, against Anthracite Coal, began to yield; and, among the more intelligent persons, its future use as a fuel was placed beyond all doubt.

The credit of the first successful application of Coal has been claimed by many, and it is hard to decide, among the numerous competitors, as to whose claims to the honor are superior. Having endeavored to present the facts, in an authentic manner, we leave it for the reader to exercise due justice and judgment in the premises.

The first successful experiment to *generate steam* with Anthracite Coal, was made in 1825 at the iron works at Phœnixville. Previously to this, John Price Wetherell, of Philadelphia, made several efforts to accomplish this, at his Lead works;—but we have understood that he only partially succeeded.

—We will now pass by three or four years, —during which little worthy of note occurred,—and behold the Coal trade, like the first smiles of infancy, starting into active existence. As early as 1812, the forests in the neighborhood of Philadelphia, as, in fact, in many of the principal towns of the adjoining counties, began rapidly to disappear. Cord wood, and every description of building timber, were held at high prices,—the former, during the winter months, frequently ranging between thirteen and sixteen dollars per cord. There were no improvements except turn-pike roads, by which the magnificent timber of some of the more distant counties could be reached; and under these circumstances, and as population and business increased, attention was directed to the feasibility of rendering navigable the Schuylkill River. It was originally designed for the products of the forest, the mine and the field—all of which abounded in the counties drained by this stream, and its numerous tributaries. The forests, especially, were remarkable for the quality of the timber, and the height and symmetrical beauty of the trees; and among intelligent capitalists little doubt was now entertained as to the destiny which awaited the product of the mine—satisfied that it needed but a fair start to ensure its onward progress.

The Schuylkill Navigation was incorporated in 1814, without mining and trading privileges, and hence it has ever been the interest of the Company to invite tonnage from all sources and in every quarter. It is one hundred and eight miles in length, and was erected at a cost of nearly three millions of dollars. It was sufficiently complete, in 1818, to allow the descent of several boats, and tolls to the amount of two hundred and thirty dollars comprised the receipts for the season. From this year to 1825, no account was kept of the different articles for which tolls were received, and we are unable, therefore to determine the amount of tonnage on Coal descending the valley, during this period. The Navigation, however, owing to the imperfection of the structure, was not in a favorable condition for the prosecution of business during any portion of this period. This arose from the obvious inexperience of the people of that day in canal-building: and obstructions of every description were of course to be expected. Of these, the most frequent were breaks in the banks of the canal, which would not only retard the progress of boats, and render the business extremely hazardous and uncertain, but subjected the Company to heavy expenses for repairs. The revenue to the stockholders was of course very limited; and at no season, we believe, previous to 1830, was it sufficient to yield a dividend of over one-half per cent.—while quite as often, a *loss* would be experienced at the close of the business season.

—From the year 1825, we may safely date the career of the Anthracite Coal Trade. At this time the prejudices of the people against Coal, as a fuel, had, in a great measure, abated. Much suffering was experienced during the winter season on account of the scarcity and high price of wood in Philadelphia; and the increased supply annually necessary for building purposes, tended materially to advocate the substitution of Coal for wood, for domestic purposes. But here a grand revolution had to be effected! New and costly stoves had to be procured, and it was some time ere the founders could venture to introduce castings for burning Anthracite. This, however, was finally done in 1828, when grates for stoves were introduced of such improved construction, that no further difficulty could reasonably be suggested. But there was one difficulty which time, the great corrector of all things, "promptly attended to:"—From the lack of bitumen in the Coal, servants were remarkably slow in getting initiated into the *modus operandi* of making a Coal-fire; and among the catalogue of the essential qualifications for a servant, was placed at the head, that of being able to "kindle and manage a Coal-fire." A lack of skill in this particular, would have destroyed the reputation of the best servants—and thanks to their skill—honest reputation was saved.

In 1825, six thousand five hundred tons of Coal were shipped from the vicinity of this borough, and from that time forth, the quantity annually increased. In 1826, over sixteen thousand tons were shipped, and in 1827, over thirty-one thousand tons. The prices of Coal at the mines commenced at \$3 08; then \$2 80; and in 1832, the price fell to \$1 51. The annual increase was about 120 per cent.; and the toll on Coal was \$1 00 per ton, while freights rose and fell alternately from \$1 25 to \$2 per ton to Philadelphia. The average price per ton in Philadelphia was between \$5 and \$6 per ton.

MINING OF COAL

IN THE ANTHRACITE REGIONS;

HISTORICAL AND DESCRIPTIVE.

Lehigh District.—This having been the theatre of the first mining operations in the Schuylkill Region, it may appropriately be the first to receive our attention. The mining here, until recently, was conducted by the Lehigh Coal and Navigation Company; but lately they have leased out their mines to individual operators, who receive stipulated sums for every ton of coal raised. The plan of mining the Coal in these mines is, in many respects, entirely different from that pursued at other places. This is owing to the peculiar geological structure of the coal deposits.

We have before stated, that as the Schuylkill basin extends to its South-eastern terminus, the Coal strata become almost perpendicular in the *dip*—just as the joints of a board canoe vary in their angle of inclination from the middle of the boat to either end. At the Mauch Chunk summit some violent disruption must have occurred, as we find a seam of Coal of great thickness, and covering an area of some sixty acres, occupying a horizontal position. It forms an anticlinal axis in the middle, and recedes downwards at both ends. How it became displaced, is a phenomenon for which we are unprepared to account.

Mauch Chunk mountain rises precipitately from the Lehigh river, where it is also the head of the Nesquehoning mountain, which at a short distance from the river, diverges from the Mauch Chunk proper, toward the North West. The Mauch Chunk extends South West about thirteen miles, to the Little Schuylkill river, which divides it from the Tuscarora mountains. Panther creek separates it on the North from the radiating hill of Nesquehoning, and the Mauch Chunk creek divides it from the Mahoning on the South. The vallies through which these creeks run, are deep and narrow. Explorations have been made in various parts of this mountain, and Coal has been discovered through its whole extent.

The celebrated Summit mines, which furnish a large proportion of all the Coal mined by the Lehigh Coal and Navigation Company, are situated on the summit of this mountain, nine miles West of the town of Mauch Chunk.

The Coal directly on the summit is worked in open quarry, and is laid open by the process of "uncovering," the most simple method of mining. This is effected, as the name indicates, by removing or uncovering the upper surface of rock, slate, and earth, which covers the Coal, for a considerable distance in extent, varying in thickness from three to fifteen feet. The excavation is an angular area, and entered at different points by roads cut around and through the Coal, in some places quite down to the lowest level. The greatest ascertained thickness of Coal at this point is fifty-three feet, but it is commonly from fifteen to forty feet. Several banks of these dimensions are exposed, interrupted only by the seams of slate and bony coal running parallel with the strata. In some spots, the Coal lies in a huge horizontal bed or basin for a considerable distance, when it rises at an angle of from 5° to 15°. (See map). In some places the veins are saddle shaped; in some positions, they and the attendant strata are wonderfully contorted and broken, and present every variety of form; in one spot, immediately on the crest of Summit Hill, the great coal basin, from some terrestial revulsion, is completely divided, the space being filled up by a perpendicular mass of Coal twenty-five feet in thickness. However much the coal strata may be disturbed in certain localities, they usually, at a short distance from the interruption, return to the general arrangement, as before described in another part of this work. It is impossible to

avoid the impressiom that some great force has disturbed the original formation, by elevating or depressing the strata.

It may not be inappropriate here to describe briefly the manner of mining the Coal at the "Great Mine," or open quarry, on Summit Hill. After the work of "uncovering" is effected, the Coal is exposed to view in an unbroken mass, when a number of hands are employed in detaching it from the huge parent bed, in large lumps; which is done by introducing a wedge between the seems running parallel with the strata, when a few taps of the sledge are sufficient to loosen and detach it. Natural joints, running also parallel with the strata, frequently afford an easy mode of separating the Coal in broken masses; the pick alone is here used, which, entering the joint, fractures the rhomboidal structure of the Coal, and thus much time and labor is saved. When the veins are interrupted by a stratification of rock or slate, as is frequently the case, boring becomes necessrry, the blast detaching masses of considerable magnitude, which are broken into smaller lumps, with sledge hammers, and afterwards prepared for market by the Coal breaking apparatus, of which a notice is given in another part of this work.

There are Railroads leading through the mines, for the purpose of conveying the Coal to the main road, and others on which the refuse Coal, rock, and rubbish are made to descend in cars, by gravity, to different points, at which such materials are discharged down the side of the mountain. These Railways are continued over the vallies, and the rubbish thrown from them has formed a number of artificial hills, shaped like a steep roof, and terminating almost abruptly in a descent of hundreds of feet. The cars are guided each by one man, who, at a proper place, knocks open one end and discharges the load. In some instances cars have run off from the end of the Railway, and the guides have been thrown down the mountain, but falling among loose rubbish such accidents have not proved fatal. Besides the incombustible refuse, there is small and inferior Coal enough here to supply the fuel for a large city for years. It is not now sufficiently valuable for transportation. Small Coal,(*Pea*) is used successfully at Mauch Chunk and elsewhere, in burning lime, and at some future day may be employed in other manufactures.

Several mines have been recently opened within a mile of the Summit mines, now being worked by contract for the Lehigh Coal and Navigation Company. (See Statistical Table.) They are portions of the same great mass, and present an inexhaustible supply of fuel, while they furnish the means of untold wealth to the individuals and companies who own the land and operate upon them. Besides there are three operations at Room Run, five miles West of Mauch Chunk; a new operation North-west half a mile from said place; four at Panther Creek Valley, and one at Springdale—all the property of the Lehigh Coal and Navigation Company. The Coal is raised at so much per ton, by contract, for the Company, and yields in all, for shipment, about seven hundred and fifty thousand tons annually.

Notwithstanding the great abundance of Coal on the Summit, hopes of procuring it from a mountain nearer to navigation, induced the company to excavate a tunnel two hundred feet below the precipitous ridge, and within two and a half miles of Mauch Chunk. This great enterprise was commenced on the 1st of March, 1824, before the construction of the rail-way to the "great mine" on Summit Hill, under the impression that the Coal strata here dipped to the South. This supposition proved erroneous, and the company, for that and other reasons, suspended their labors. The tunnel is sixteen feet wide, eight feet high, and penetrates the mountain, through hard conglomorate rock and pudding stone, seven hundred and ninety feet. Three thousand seven hundred and forty-five cubic yards of stone were removed, at an expense of twenty-six thousand eight hundred and twelve dollars, or seven dollars and sixteen cents per cubic yard.—When the Company became satisfied of the present inexpediency of making further progress with the tunnel, they resolved to lay a rail-way from Mauch Chunk to the "Great mine," which they commenced under the direction of Mr. White, then manager, on the 8th Jaunary, 1827. Everything about the road—the mine—the descent—the scenery—the shute at the landing, is well worthy the attention of the most indifferent observer. The road descends from the mine to the top of the shute at the rate of one hundred feet per mile, and the descent is accomplished, by means of gravity, usually in about half an hour. At the top of the hill is a building, containing the machinery, a one hundred horse engine, &c., by which the descent of the loaded cars is governed; the most important part of which is a large cylinder, revolving horizontally, and serving to wind the rope or iron band attached to the cars. The latter are rolled by hand, and by the aid of mules, on a circular platform, which, revolving horizontally upon a perpendicular axis, brings the cars upon a line with the inclined plane, upon which they are launched. The rapidity of their progress is in a measure checked by the weight of the empty ascending cars, which being fastened at the other end of the rope or band, and moving on a parallel railway on the same plane, necessarily mount as rapidly as the loaded cars descend. But the partial counterpoise is insufficient to moderate properly the speed of the descending cars.—This object is effectually gained by an iron band which clasps the drum, and which, compressed by a lever, controls its motion. Accidents have bean rare in this descent, but the cars have sometimes deviated or broken loose. They are now guarded against by a very simple, yet ingenious contrivance. The rail-way is double until the most rapid part of the descent is passed, when both ways curve and unite into one. Should a car break loose, its

momentum will be so great as to prevent its following the curve, and as soon as it reaches the spot, it is thrown out, over-turned, and lodged on a clay bank formed for this purpose below. Farther down, a bulwark is constructed, overarching the rail-way, to intercept the loose coal as it flies from the cars. When the car arrives at the foot of the inclined plane, it pitches into a downward curve in the rail-way, and a projecting bar, which secures the lower end of the car, and which, for this purpose, is hung on a horizontal axis, knocks it open, and the Coal slides down a steep funnel or chute, into the canal boat, which, receding from the shore by the impulse thus given it, occasions the Coal to spread evenly over its bottom.

The Coal is brought from the mines to the top of the hill in the same manner as described above. The loaded cars ascend, while the empty ones descend, to be again filled.

The *Room Run* mines, belonging to the same company, occupy a situation in a defile of the mountain, through which passes a sparkling and bounding rivulet, called Room Run, from which the mines take their name; the distance is four miles and a half from Mauch Chunk. Some twenty veins have been explored, many of which are now being worked, varying in thickness from five to fifty feet. This basin is supposed to be a continuation of that of Mauch Chunk; some of the veins have been traced three miles and a half along the mountain. All of them are accessible above water level, and are worked by drifting, and horizontal tunnels cut frequently through solid rock for a distance of several hundred yards; some of them have great facilities for drainage, and are provided with most desirable roofs and floors of slate, which render them susceptible of cheap excavation. This is especially the case of a twenty-eight feet vein into which three openings at different elevations have been made, whence coal of the first quality and highest lustre has been taken. Other veins approach so near the surface of the mountain, particularly the vein of fifty feet, that it is wrought by "uncovering" after the manner of the *great mine* on Summit Hill. It has been observed that the most solid, homogeneous and perfect masses of Coal have been found under the thick strata of slate, with a sharp dip; and that a soft and pliable Coal is to be expected beneath an earthy and porous covering. The cause of the difference would seem to be, that in the first case the atmospheric water is excluded from the Coal, and is carried away by the upper surface of the slate strata, whilst in the second it percolates and softens the Coal, dividing it into small particles, which adhere feebly to each other.*

Professor Silliman describes a peculiar formation of the great bed of fifty feet, and its contiguous strata. They rise in form of a half ellipse, placed on end with the curve uppermost; the form of the mountain of which they are part. There is here, he observes, the most striking appearance that these strata have been raised by force from beneath; and it is difficult to avoid the conviction that they were also broken at the top; for at the upper end of the stratum of Coal, there is a huge rock, twenty feet in two of its dimensions, and five or six in the other, which has been broken off from the roof rock, graywacke, of which it is part, and fallen in; and the Coal seems then to have closed all around and shut it in on all sides, except that in one place on the right hand a little below the top, the rupture is continued to the surface, and that place was then filled and concealed by the loose rubbish and soil, as was also the rock above. These circumstances confirm strongly the truth of the supposition, that an upheaving force, excited with great energy, has bent, dislocated and broken the strata.

This vein is broken by the ravine, and worn down by the stream which passes through it, but reappears on the opposite side, where it assumes a form more curious and extraordinary. The strata, as in the corresponing part, radiate from the surface, and the interior upper angle, so far as it has been uncovered, is filled with sand stone, arranged in reverse concentric arches, laid so regularly as to have the appearance of having been placed by art. The stones of the respective arches increase their dimension with the size of the arch. The form of these arches would seem to militate against the hypothesis of an eccentric force, unless we presume, what is probably true, that the gravitation of the strata in opposite angles of about forty-five degrees produce this result.

To avail themselves, in the best manner, of these new treasures, the company have made a rail-way of five miles. This road follows the curve of the mountain along the Lehigh for about two miles; and then still winding with the mountain, turns easterly, and runs parallel to the Nesquehoning Creek, to the ravine of the mountain, made by Room Run, which it ascends. The whole of the road from the Coal mines to the landing is descending. On the self-acting plane the descending car will bring up an empty one. The intermediate road is graduated from ten to twelve inches descent in one hundred feet; this being considered the lowest grade on which a loaded car will descend by gravity, and therefore the most favorable one that can be devised, when the freight, as in this case, is all one way.

There are many curious and distinguishing marks, connected with the Coal deposits in this region, which, to be properly understood, should be described in detail, and which the limited extent of our work at present precludes.

The Coal mined in the Beaver Meadow, Spring Mountain, Hazleton, Buck Mountain, Whitehaven districts, &c., is generally sent down the Lehigh Navigation.

---

* Abridged from the Gazetteer of Pennsylvania—1834.

SCHUYLKILL DISTRICT.—Like every other branch of business, the mining of Coal has undergone many different changes and improvements, since its commencement. We have frequent cause for astonishment, while regarding the progress of improvement in every department of busy life; and although it would seem, standing upon the platform of the present, and taking in the whole perspective of the past, with its numerous shades, that we have really achieved the *ne plus ultra* of inventive genius;—still, as the world goes on, new enterprizes are opened—new feelings are instilled, and new desires are to be filled:—so that the *field* for thought and scientific knowledge is continually enlarged, and the progress of invention must always be proportionably rapid.

When openings were first made for Coal in the vicinity of Pottsville, the shafts were sunk to the depth of from twenty to thirty feet, and the Coal hoisted in large vessels, by means of a common windlass. As soon as the water become troublesome, which was usually the case after penetrating beyond thirty feet, the shaft was abandoned, and another sunk—and the same simple process repeated.

This mode, however, was soon superceded by *drifts*—(or openings above water-level,—running in with a surface sufficiently inclined to drain off the water.) These would be opened at the heads of veins upon the hill-sides, and the Coal brought out in wheel-barrows; but it was not until 1827 that rail-ways were introduced into mines, and from that period until 1834, drifts were the only mode pursued for mining Coal.

In the meantime, various experiments had been made for the use of shafts, the principal one of which was the substitution of horse-power and the gin, for the windlass, by which they were enabled to clear the water from the shaft with greater facility, and to penetrate somewhat farther down on the veins. But with this great improvement, as it was then regarded, they were enabled to run down on the vein for but a comparatively short distance, and the coal was, of couse, inferior; for experience has since demonstrated that the crop of the Coal is never equal to that taken out at lower depths,—when the roof and floor have attained the regularity and hardness so necessary for effective labor, and good Coal.

At the period to which we have alluded, there was a total and perfect absence of every convenience which is now deemed necessary for mining operations. The country itself was,—we were about to say, *uninviting;*—but such we never could have esteemed it. There never *was* a more grand, picturesque region,—beautiful at all seasons,—grand in all eyes,—precious to the man of science, the capitalist, and to the whole world of business. But if it be wild and beautiful *now*, when jealous art has despoiled it, somewhat, of its wild aspect—stripped the mountains of their gaudy foliage, and levelled the venerable and sturdy forest trees to the earth—with here and there one remaining, stripped of bark and branches—as if intended for monuments to their perished fellows;—what must it *not* have been when the howls of the wild-beasts went forth in the solitary depths of the woods,—in the deep ravines and mountain-passes until then unexplored by man? The cuuntry, then, clothed in its rich spring garb, fragrant with its wild-flowers—musical with its numerous streams—majestic with its frowning crags and precipices;—in its general range, resembled the green ocean "into tempest tossed," and its silence was the sleep of Nature, when, like a miser, she had finished burying her treasures!

But what we wished to convey is, that the country, at this period, was destitute of those conveniences for sustaining life, and for carrying on a regular business, which are rightfully looked for by the laborer. The only mode of transporting Coal from the mine, was by common wagons, over roads at all seasons bad, and through a country in which, from its mountainous character and wild state, the horse was enabled to accomplish but little, in comparison with what could be done in a level and more improved country.

But notwithstanding these difficulties, the work was still pursued, and that most assiduously. The prices commanded by Coal afforded but a scanty pittance to the laborers employed, without insuring the least profit to the owner of the lands. Previously, the inhabitants of the country subsisted entirely by their skill in hunting. Every species of game were plenty, and the skins of bears, wolves, wild cats, foxes, &c., as well as the quarters of deers, and birds, were eagerly sought in the country and towns adjacent. The hunters, few in number, lived in rude cabins far from each other, and there was scarcely a path in the early history of the country, by which the steps of the stranger could be directed.—All the Coal mined anteriorly to 1813, was mostly sold to blacksmiths in the surrounding country;—for to haul it away for fuel, while wood was still plenty, could not be afforded, nor justified by the economist.

Although the Schuylkill Navigation, as previously stated, had been completed in 1818, its facilities for transporting Coal were not of such character as to warrant the mining of any considerable quantity. Having been thrown out of repair, time after time, by freshets, its use could by no means be relied upon, and thus, from 1818 to 1825, the trade, if it may be said to have had existence at all, was so extremely limited and uncertain in its general features and prospects, that little attention was bestowed upon it. The whole extent of the trade of the Anthracite regions, from this period to 1824, did not exceed forty thousand tons. In 1825, (the year following,) this amount was nearly doubled,—of which the quantity sent down the Schuylkill was 6,500 tons; that of the Lehigh 28,100 tons, and of the Susquehanna no account has been kept.

From this year, therefore, the existence of the Schuylkill trade may be dated—that of the Lehigh having commenced five years previously

The introduction of railways into this region, which occurred in 1827, is, perhaps, one of the most important epochs in its history.—The natural arrangement of the country is admirably adapted for grading and laying down railways, and it was on this account that their introduction was more welcome. The Coal seams crop out by the sides of the mountains, and the vallics between them, usually affording small streams, allow sufficient grade to convey the loaded cars to the head of navigation, by gravity. The distinguished credit of having been the first person who erected a railway in our region, is, we believe, assigned to the late Abraham Pott; who constructed one, over half a mile in length, leading from his mines, east of Port Carbon, to the navigation at that place.

Their subsequent introduction into drifts, by which the cars were drawn in the mines by mules, gave a new impulse to the business, and greatly added to the capacity of each operator. In 1826, the amount shipped was nearly seventeen thousand tons, and in 1827, it was over thirty-one thousand tons. In 1828, it reached forty-seven thousand; in 1829, seventy-nine thousand; 1830, eighty-nine thousand; and in 1831, eighty-one thousand tons.

During this period, Coal was being generally used in stoves, in the more populous towns; and after the grate was introduced into them, which was accomplished more or less successfully between the years 1827 and 1831, the trade began to assume an imposing and gigantic attitude. For no sooner had the people become familiar with its peculiar properties, than its vast future importance in the Arts and Manufactures was readily acknowledged.

In 1826 and '27, large accessions had been made to the population and business of the region. The Schuylkill Navigation had been placed in excellent repair, and interruptions in its navigation were no longer experienced. This happy state of affairs continued until 1829, when a momentary pause was made in the trade,—but it was a pause prophetic only of still greater triumphs—of busier scenes—and of more active life. It was at this period that scenes of excitement, speculation, and daring enterprize were enacted, which surprised and startled our good old Commonwealth from her Quaker propriety! Capitalists awoke, as if from a dream, and wondered that they had never before realized the importance of the Anthracite trade! What appeared yesterday but as a fly, now assumed the gigantic proportions of an elephant! The capitalist who, but a few years previously, laughed at the *infatuation* of the daring pioneers of the coal trade, now coolly ransacked his papers, and cyphered out his available means, and whenever met on the street, his hand and pockets would be filled with plans of towns—of surveys of Coal lands, and calculations and specifications of railways, canals, and divers other improvements, until now unheard of! The land which yesterday would not have commanded the taxes levied upon it, was now looked upon as "dearer than Plutarch's mine—richer than gold." Sales were made to a large amount, and in an incredible short space of time, it is estimated that upwards of *five millions of dollars* had been invested in lands in the Schuylkill Coal field alone! Laborers and mechanics of all kinds, and from all quarters and nations, flocked to the Coal region, and found ready and constant employment, at the most exorbitant wages. Capitalists, arm-in-arm with confidential advisers, civil engineers, and grave scientific gentlemen, explored every recess, and solemnly contemplated the present and future value and importance of each particular spot. Houses could not be built fast enough, for where nought but bushes and rubbish were seen one day, a smiling village would be discovered on the morrow.—Enterprising carpenters in Philadelphia, and elsewhere along the line of canal, prepared the timber, and framed the house complete, and then placing the *material* on board a Canal boat, would hasten on to the enchanted spot to dedicate it to its future purposes. Thus *whole towns* were arriving in the returning Canal boats,—and as "they were forced to play the owl," a moon-light night was a god-send to the impatient proprietors—for with the dawning of the morning, would be reflected the future glory of the new town, and the restless visages of scores of anxious lessees. Rents were enormously high;—a frame tenement that had cost perhaps three hundred dollars, if eligibly located, would command at least two hundred dollars per annum.

In laying out a town, and while the proprietor was descanting fluently on its prospects and the great destiny which awaited it, he was asked upon what terms he would dispose of a corner-lot, upon what was intended to be the main thoroughfare. "Five thousand dollars!" said the proprietor. "Why, sir," meekly replied the person in quest of it, "for five thousand dollars I could buy a lot, equally as large, in Philadelphia." "O, my dear sir," said the proprietor, exultingly, "you must not pretend to compare Philadelphia, in a *business point of view*, with this place! A few years, sir, will render this the great metropolis of trade,—and Philadelphia will be nothing to compare with it!"

—In connexion with these scenes, we may here introduce a "Charcoal Sketch" from the pen of the late Joseph C. Neal. He resided in Pottsville during the time he so humorously, yet truthfully describes, and no doubt was one of those "graduates" who was rendered wiser for the experience obtained:

We perceive, by the Miners' *Journal*, that Pottsville—the El Dorado of 1829—has not shared the fate which is usually allotted to precocious youngsters, and that it holds a very respectable rank in point of size and population. Well, we are glad of it, for it is a beautiful village, and situated in the bosom of the most romantic country of which Pennsylvania can boast. But there are many who do not recall its image with complacency, nor remember its crags and peaks with anything resembling a glow of satisfaction. The army of youths who rushed there in 1829 terminated

their expedition in a retreat, like that of Napoleon in Moscow, bringing away with them nothing but glory, and as much experience as that amounts to. They will, however, be wiser men, if not richer, for the rest of their lives.

In the memorable year to which we allude, rumors of fortunes made at a blow, and competency secured by a turn of the fingers, come whispering down the Schuylkill and penetrating the city. The ball gathered strength by rolling—young and old were smitten with the desire to march upon the new Peru, rout the aborigines, and sate themselves with wealth. They had merely to go, and play the game boldly, to secure their utmost desire. Rumor declared that Pipkins was worth millions, made in a few months, although he had not sixpence to begin with, or to keep grim want from dancing in his pocket. Fortune kept her court in the mountains of Schuylkill county, and all who paid their respects to her in person, found her as kind as their wildest hopes could imagine.

The Ridge-road was well travelled. Reading stared te see the lengthened columns of emigration, and her astonished inhabitants looked with wonder upon the groaning stage-coaches, the hundreds of horsemen, and the thousands of footmen, who streamed through that ancient and respectable Borough, and as for *Ultima Thule*, Orwigsburg, it *has not recovered from its fright to this day!*

Eight miles further brought the army to the land of milk and honey, and then the sport began—the town was far from large enough to accommodate the new accessions; but they did not come for comfort,—they did not come to stay. They were to be among the mountains, like Sinbad in the valley of diamonds, just long enough to transform themselves from the likeness of Peter the Moneyless into that of a *Millionaire;* and then they intended to wing their flight to the perfumed saloons of metropolitan wealth and fashion.—What though they slept in layers on the sanded floors of Troutman's and Shoemaker's bar rooms, and learned to regard it as a favor that they were allowed the accomodation of a roof by paying roundly for it, a few months would pass, and then Aladdin, with the Genius of the Lamp, could not raise a palace or a banquet with more speed than they!

One branch of the adventurers betook themselves to land speculations, and another to the slower process of mining. With the first, mountains, rocks, and valleys changed hands with astonishing rapidity. That which was worth only hundreds in the morning, sold for thousands in the evening, and would command tens of thousands by sunrise—in paper money of that description known among the facetious as slow notes. Days and nights were consumed in surveys and chaffering. There was not a man who did not speak like a Crœsus—even your ragged rascal could talk of his hundreds of thousands.

The tracts of land, in passing through so many hands, became subdivided, and that brought on another act in the drama of speculation: the manufacture of towns, and the selling of town lots. Every speculator had his town laid out, and many of them had scores of towns. They were, to be sure, located in the pathless forests; but the future Broadways and Pall Malls were marked upon the trees; and it was anticipated that the time was not far distant when the deers, bears and wild-cats would be obliged to give place, and take the gutter side of the belles and beaux of the new cities. How beautifully the towns yet unborn looked upon paper!—the embryo squares, flaunting in pink and yellow, like a tulip show at Amsterdam; and the broad streets intersecting each other at right angles, in imitation of the common parent, Philadelphia. The skill of the artist was exerted to render them attractive; and the more german text, and the more piuk and yellow, the more valuable became the town! The value of a lot, bedaubed with vermillion, was incalcalable, and even a sky parlor location, one edge of which rested upon the side of a perpendicular mountain, the lot running back into the air a hundred feet or so from the level of the earth, by the aid of the paint box, was no despicable bargain: and the corners of Chesnut and Chatham streets, in the town of Caledonia, situated in the centre of an almost impervious laurel swamp, brought a high price in market, for it was illustrated by a patch of yellow ochre!

The bar-rooms were hung round with these brilliant fancy sketches; every man had a roll of incheate towns in the side-pocket of his fustian jacket. The most populous country in the world is not so thickly studded with settlements as the Coal Region was to be; but they remain, unluckily, in *statu quo anti bellum.*

At some points a few buildings were erected to give an appearance of realizing promises. There was one town with a fine name, which had a great barn of a frame hotel. The building was let for nothing; but after a trial of a few weeks, customers were so scarce at the Red Cow, that the tenant swore roundly he must have it on better terms, or he would give up the lease.

The other branch of our adventurers bent their attention to mining; and they could show you, by the aid of a pencil and piece of paper, the manner in which they must make fortunes, one and all, in a given space of time—expenses, so much; transportation, so much; will sell for so much: leaving a clear profit of ——! There was no mistake about the matter. To it they went; boring the mountains, swamping their money and themselves. The hills swarmed with them; they clustered like bees about a hive; but not a hope was realized. Calculations, like towns, are one thing on paper, and quite another when brought to the test.

At last the members of the expedition began to look haggard and careworn. The justices done a fine business; and Natty M—s, Blue Breeches, Pewter-Legs, and other worthies of the catchpole profession, toiled at their vocation with ceaseless activity. When the game

could not be run down at view, it was taken by ambuscade. Several bold navigators discovered that the county had accommodations at Orwigsburg* for gentlemen in trouble. Capiases, securities, and bail-pieces became as familiar as your garter. The play was over, and the farce of "*The Devil to Pay*" was the after-piece. There was but one step from the sublime to the ridiculous, and Pottsville saw it taken!

Gay gallants, who had but a few months before rolled up the turnpike, swelling with hope, and flushed with expectation, now betook themselves, in the grey of the morn, and then the haze of the evening, with bundle on back—the wardrobe of the Honorable Dick Dowles tied up in a little blue and white pocket handkerchief—to the tow-path, making, in court phrase, "mortal escapes"; and, in the end, a general rush was effected—the army was disbanded—*suavi qui peut?*"

—The Miner's *Journal*, in copying the above into its columns, prefaced it with some remarks, which had the effect of calling out the following from the same writer:

There are veterans, yet surviving, who participated in the chase of speculation, and found themselves "done up" before the game was run down. They remember their day-dreams—more vain and fantastic than any ever entertained by Murad, the Unlucky—and recall them, at their leisure moments, to "use for their mirth, yea, for their laughter." It is true they have not broad acres of Coal land, drifted and tunnelled; they have no towns or cities—unless they choose to scribble them on foolscap; nor did they return from the hills laden with the golden fleece: but they are tolerably rich in experience, and have learned to treat disappointment as it should be treated—laugh at it, and deeply con the lesson which it offers. The Pottsville lesson, too, is the best afforded by modern times: and those who took their degrees in that College, may justly boast of being well instructed in all the branches which it professed to teach. Men may forget their classic lore—their mathematics may ooze away; but pecuniary experience—well whipped in—leaves impressions not easily obliterated; and the pupils of the Coal Region University can assert, without fear of contradiction, that their *alma mater* did not "spare the rod and spoil the child!" They "got it" roundly, and perhaps deserved what they got.

The days of that schooling were pleasant days, after all, to some constitutions. Many hands make light work both of pleasure and pain, and fellowship robs misfortune of its sting—perhaps more effectually than it increases our gratifications. At first, the excitement of pursuing wealth, was sufficient to render the Coal Region a merry place—when men had time to be merry. They were happy, if they had not leisure to show it; and the contracted brow and firm-set mouth of the speculator, as he bestrode through the mud, betokened as much inward delight as ever was typified by the broad grin of the unthinking African. And afterwards, when fair estates and lordly wealth melted from the hand like a grasped snow-ball—why, there were plenty more with fingers as wet, palms as chilled, and faces as rueful. It was the fashion, and all men laughed—each at his neighbor. The great majority were young men, just stepping upon the stage of active life—full of energy and spirit, and proof against care-bounding hearts, that did not ask inspiration from the pocket, and sunk not, even when dunned by importunate creditors.

Many were the pranks played off, to the annoyance of the more sober-minded. Mock-duels were got up in several instances, to rid the town of individuals who were disliked. In two cases, men fled the place, firmly impressed with the belief that they had slain their opponents, and though undeceived, never returned: an unjustifiable species of trickery, however, which once had a melancholy termination, as every resident of the Coal Region at the time, and many in Philadelphia, will remember. The town authorities, in endeavoring to preserve proper decorum, fell in for their share of annoyance, and one of them asserted, positively, that an attempt had been made by the youth of the place (while firing out the old year, before his door, with a swivel,) to assassinate him and his family. He even went so far as to produce a large stone to a magistrate, which he solemnly declared had been fired from the aforesaid piece of ordnance into his bed-chamber; but, unluckily, on trial, it was discovered that the missile was several inches larger than the calibre of the piece; and it was therefore gravely decided by his honor, the justice, that, if the stone *never went in*, it was useless to argue that it had ever been fired out! The case was, therefore, dismissed; but we have no doubt that the worthy dignitary yet believes that his version of the "gun-powder plot" is the true one.

But in these days of scribbling, there will, of course, be published a volume, or more, of Sketches—descriptive, personal, and statistical—of the Coal Region as it is, and as it was; and it is therefore invidious to touch further on the ground. The field is left open to the adventurous wight who will undertake the task; and if possessed of the proper requisites, he will doubtless find it more profitable than boring holes in rocky mountains proved to be some years ago."

—"Alas! Poor Yorrick! He was a fellow of Infinite jest—excellent good humor." "After life's fitful fever, he sleeps well! Peace to his ashes?"

"The days of speculation, however, were not terminated in '29; and a few words more remain to be said concerning them. Many persons who had purchased lands, moved here with their families, designing to take up their permanent abode in the Region, and pursue the mining business regularly, as they would farming, or any other calling. But in a ma-

* At this period (1829-'30) the statute recently repealed, relating to imprisonments for debt, was in full force.—[EDITOR.

jority of cases, the lands were purchased in large tracts, by companies formed for the purpose, and these, as well as many tracts held by single individuals, were leased out to tenants. These joint-stock companies, or those composed of citizens of other States, obtained charters for the mining of Coal from the Legislatures of their respective States, and thus evaded the statutes of *mortmain* in force here,—and the lands owned by them were held by deeds of trust, and were thus used and occupied. But no sooner were companies chartered by the Legislature of this State, than a general law was passed escheating the lands of companies formed under charters not granted by this State, and held without its license and consent. This was done in 1833, when the trade had partially recovered from the speculations of the previous years.

It was under such circumstances as these that a vast amount of capital had been expended in the Region, not only in the improvement of the lands, and the facilities for mining coal;—but in the construction of railways, and similar improvements, of the most stupendous character.

The town of Pottsville, which was then as now, the great focus of business and enterprize, sprung from a small village into a town of large pretensions, in a very short time.—Its population trebled annually, while the number of strangers continually arriving and departing, nearly equalled the number of its regular citizens. The hotels were not only crowded, but in fact, were literally filled in every part. An individual who was fortunate enough to possess a bed, enjoyed a kingly luxury. "Tired nature's sweet restorer" was, frequently, only to be sought on the sanded floor of the bar-room; and here the lively imagination of Neal, and the broad humor of Wallace, were lulled into dreams—perhaps, not *all* dreams!—For lying thus one summer's night, sweating in the close air, and endeavoring to keep at bay the common enemy,—musquitoes and fleas,—Mr. N. stretched his limbs, and groaned: "Jim! —I say, Jim: let's get up *and rest awhile!*"

In contemplating these times, though we cannot but laugh at the ludicrous scenes they present, all will admit that they were the indirect and direct means of accomplishing incalculable benefit to the whole country. Nor was it possible, under the circumstances, to restrain the fever of speculation. The real value and resources of the lands were comparatively unknown, and in the hands of those who had no intention of "piercing the bowels of the earth, and bringing forth from the caverns of mountains treasures which shall give strength to our hands, and subject all Nature to our use and pleasure,"—a fectitious value could not but be placed upon them. Calculations were cunningly made of the number of *square yards of Coal* in an acre, and the quantity each acre was capable of yielding—without considering the labor and expense necessary to mine it, or without knowing in fact, that it contained Coal at all,—and exhibiting such calculations, in glaring and *bona fide* figures, to the bewildered capitalists, land would sell for one hundred dollars an acre to-day; to-morrow for three hundred, and then for five hundred dollars. And when, at last, the tracts were cut up into small parcels, to suit the means of the purchaser, they would presently be esteemed as beautiful locations for towns, and straightway plans were laid out on paper, elegantly printed and colored,—and, finally, the whole would wind up with a sale of "valuable town-lots"—lying, perhaps, in the heart of a swamp, a forest, or upon the brow of a mountain. This *last* operation, would frequently prove the "noblest Roman of them all;" for although the purchaser might have paid five hundred dollars per acre for the whole plot, he would realize the whole of that sum on a single "corner-lot," and if he would make five or six hundred lots, there would be no such thing as estimating his profits!

People were so excited that nothing could astonish them. New "discoveries" of valuable minerals were made daily. Copper, lead, iron-ore, gold, and silver were by some of the "victims," believed to abound in the Region. A well-known gentleman of Philadelphia, and whose judgement is deemed *au fait* in all matters of Chemistry, visited here in '30, and before setting out he placed in his coat-pocket a large piece of native silver. Upon his arrival he, he handed over the "massive wedge" to a friend, who, under the pretence of viewing his landed possessions, and making still further explorations, left the hotel in the morning. In the evening, apparently fatigued with his "labors," he returned to the hotel, and while others were discussing the "discoveries" of the day, he cooly observed that he would not exchange his successes for all the coal-lands in Christendom! "*I*, gentlemen," said he, assuming a very deliberate manner, and a somewhat "mysterious" countenance; "I have discovered one of the most valuable bodies of *Silver* in the world! And here, to convince you of its quality, I have brought along a small specimen, which I picked up indiscriminately among a wagon-load of them," and the speaker proceeded to exhibit the "specimon," coarsely wrapped up in his handkerchief.

"My God! sir,"—said the landlord, in great astonishment,—"*is it* possible—why, just feel how heavy it is!" The lucky "discoverer" was now surrounded by the group, and there were some so incredulous that, nowithstanding its weight and "silvery cast," they were not satisfied that it was really silver. It was therefore concluded to wait upon Mr. W. who at the moment happened to be absent. Giving the "specimen" to one of the party, with the understanding of "*mum*," Mr. W. was called in. That gentleman calmly drew on his spectacles—looked at it—felt it—turned it over. "Why, where did this come from?" said he, musingly. "This is silver—pure silver! I declare, it is the *richest specimen of silver I ever saw*;—where did it come from, eh?"

The "discoverer" intimated that there was "some more of the same sort left" in the immediate neighborhood, but as for the exact

ocality, not being the owner of the lands, it could not, of course, be expected that he should openly disclose the fact until he could secure them.

"But can you *find* the place again?—did you leave no mark?"

"O yes!—certainly—to be sure! I piled up several stones, and notched several trees hard by."

The next day nothing was talked of but silver mines, and long before daybreak the excited landlord, moved with the laudable impulse of securing the lands—of "plowing deep while sluggards sleep, forsook his pillow and ventured out boldly into "the rheumy and unwholesome air." He was missed at the breakfast table—do. at dinner. A drizzling rain had rendered the day extremely dull, and as few went out in pursuit of their affairs, the hotel was crowded. At last the corpulent form of the landlord, his clothes mudded and thoroughly saturated from the "crown of his hat to the tip of his toe," was perceived descending the hill, and gliding cautiously into the back yard. The joke soon reached the "vulgar ear;" and the worthy host was more than once questioned in matters relating to silver mines—and especially as regarded "*piled stones and notched trees!*"

We shall dismiss this subject with a single remark. The speculating mania had involved hundreds of persons unto utter ruin; and there were few persons of fortune who now ventured, voluntarily and alone, into the mining business. Companies were formed, not only for the purchase of the lands, but also for conducting mining operations upon them; and it was thus hoped, that by concentrating the lands and business of the region into the hands of a few, whose combined capital and influence could silence individual competition, that the trade could be made obedient to their wild schemes. Coal had already been universally adopted; and by withholding supplies when they were absolutely needed, it was thought that it could be made to command from eight to twelve dollars a ton; and then, the price being thus established, another series of "calculations" of the value of each particular acre of Coal land, and fresh ground for speculations, would be laid open. Advocates for Coal companies were consequently not lacking, and many were chartered by the Legislature. But the practical experience of those interested in the trade, soon awakened a powerful opposition to them, and this feeling has existed from very nearly the commencement of the trade until the present time. It was especially active from 1831 to 1839, during which the trade had thrice fallen off, in the gross amount of the annual product, from the years respectively preceding; and during the whole of which period, the influence of the Miners' *Journal*—the accredited organ of the trade from its commencement in 1825—was directly arrayed against them. The country, through such aid, was happily saved from the calamities which threatened the trade, and which did much, during this period, to retard its annual growth.

Nothing worthy of special notice occurred in the progress of the Anthracite trade, until 1838–'39, and 1840. It was during this period, that the attention of intelligent and enterprising citizens was called to the practicability of using Anthracite Coal for the smelting of iron ore. Dr. Geisenheimer, of New-York, had, in the latter part of 1838, and before similar results had been obtained, or at least promulgated in Europe, secured a patent for smelting iron with anthracite and hot blast; but Mr. Crane having, about this time, succeeded in a series of experiments in Wales, having in view the same object, is understood to have purchased the claims of Dr. W., which were as follows:—*First:* In the application of Anthracite Coal, exclusively or in part, for deoxidating and carbonating iron ore. *Second:* The application of Anthracite Coal, exclusively or in part, in combining iron in a metallic state, with a greater quantity of carbon; if bar-iron, for steel; if pig or cast-iron, for a superior quality, &c. *Third:* The smelting or reducing of iron ore, so deoxidated and carbonated by the application of Anthracite Coal as aforesaid, into pig or cast iron. *Fourth:* The refining or converting of iron ore, so deoxidated or carbonated by the application of Anthracite Coal, as aforesaid, into malleable or bar iron. *Fifth:* The application of Anthracite Coal as a fuel, in smelting or reducing iron ore raw or roasted, but not prepared by a separate process of deoxidation and carbonation as above described, into pig or cast iron. *Sixth:* Though not claiming an exclusive right of the use of heated air for any kind of fuel, nevertheless he claimed the use of heated air, applied upon and in connexion with the said principle and method discovered by him to smelt iron ore in blast furnaces, with Anthracite Coal, by applying a blast of air in such quantity, velocity and density, or under such pressure, as the compactness or density, and the continuity of the Anthracite Coal requires, as above described, &c.

As soon as this transfer was effected, Mr. Crane obtained a patent in this country, which differed slightly from Dr. W.'s. But it was several months anterior to the dates of both these patents that a furnace had been blown in at Mauch Chunk, which used anthracite as the fuel, and this enterprise was followed, in a short time after, by a more extensive and successful one at Pottsville. In consequence of this, and in view of the certainty of litigation, Mr. Crane never insisted upon an observance of his claims by priority of discovery, but, as we are informed, published a card, formally renouncing them.

Experiments for using Anthracite Coal in blast furnaces, had been made at Mauch Chunk in 1820, by the Lehigh Coal Company; and up to the period of Mr. Crane's method, vast sums of money had been expended, from time to time, in different parts of Europe, to effect the same object;—but every attempt proved unsuccessful. The thing had been almost entirely abandoned as impracticable, when the great secret seems to have been

imparted simultaneously in Europe and America;—for while Mr. Crane was rejoicing over his triumphs in Wales, three enterprising gentlemen of Reading were repairing and blowing in their furnace at Mauch Chunk—and if not the very one previously abandoned, it was the ground, at least. which had sustained a defeat!

From a letter by Mr. Lowthrop, dated at Beaver Meadows, to Prof. Walter R. Johnson, of Philadelphia, we gather the following interesting particulars concerning this first application of Anthracite Coal for smelting purposes: The experiments, says Mr. L., were made by Messrs. Joseph Baughman, Julius Guitean and Henry High, of Reading, in an old furnace which was temporarily fitted up for the purpose. They used about eight per cent. of Anthracite, and the result was such as to surprise those who witnessed it, (for it was considered as an impossibility, even by iron masters; and amply sufficient to encourage those engaged in it, to go on. In order, therefore, to test the matter more thoroughly, they built a furnace on a small scale, near the Mauch Chunk Weigh-Lock, which was completed during the month of July, 1839. The dimensions, &c., were as follows: Stack, 21½ feet high, 22 feet square at the base. Boshes, 5½ feet across. Hearth, 14 by 16 inches in the square, and 4 feet by 9 inches from the dam stone to the back. The blowing apparatus consisted of 2 cylinders, each 6 feet diameter; a receiver, same diameter, and about 2½ feet deep; stroke, 11 inches;—each piston making from 12 to 15 strokes per minute.—An overshot water-wheel, diameter 14 feet; length of bucket, 3½ feet; number of buckets, 36; revolutions per minute, from 12 to 15.

The blast was applied August 27th, and the furnace kept in blast until September 10th, when they were obliged to stop in consequence of the apparatus for heating the blast proving to be too temporary. Several tons of iron were produced of Nos. 2 and 3 quality. Temperature of the blast did not exceed 200° Fahrenheit—the proportion of Anthracite used not remembered.

A now and good apparatus for heating the blast was next procured, (at which time Mr. Lowthrop became personally interested in the works,) consisting of 200 feet in length, of cast iron pipes, 1½ inches thick; it was placed in a brick chamber, at the tunnel head, and heated by a flame issuing thence.

The blast was again applied about the last of November, 1833, and the furnace worked remarkably well for five weeks, exclusively with Anthracite Coal; they were then obliged, for want of ore, to blow out on the 12th of January, 1839. During this experiment, says Mr. L., our doors were open to the public, and we were watched very closely both night and day—for men could hardly believe what they saw with their own eyes, so incredulous was the public in regard to the matter at that time. Some iron masters expressed themselves astonished, that a furnace *could work* whilst using unburnt, unwashed, frozen ore, such as was put into our furnace. The amount of iron produced, was about 1½ tons per day, when working best, of Nos. 1, 2, and 3 quality—the temperature of the blast being still about 400° Fahrenheit.

The following season the hearth was enlarged to 19 by 21 inches, and 5 feet 3 inches from the dam stone to the back of hearth; and on July 26th, the furnace was again put in blast, and continued in blast until November, 1840,—a few days after the dissolution of the firm, when it was blown out in good order.—For about three months no other kind than Anthracite was used, and the product was about 100 tons of iron, good Nos. 1, 2 and 3 quality. When working best, the furnace produced about two tons per day. Temperature of the blast was from 400 to 600° Fahrenheit.

The following ores were used: "Pipe" ore, from Miller's mine, near Allentown; brown hematite, commonly called *top mine*, or ironface ore; "rock" ore, from Dickerson's mine in New Jersey; and "Williams township" ore, in Northampton county. The last mentioned ore produced a very strong iron, and when it is considered that these experiments were conducted under circumstances wholly unfavorable, and that the furnace and machinery were thoroughly defective,—the results obtained may be viewed as being in the highest degree satisfactory.

In December, 1839, this furnace was blown out, the work discontinued, and the firm dissolved. The furnace at Pottsville having, at this time, been in operation, and its performances having been decidedly superior, the credit of first *successfully* introducing Anthracite Coal for smelting purposes has been very justly claimed by the citizens of that place. For although the furnace at Mauch Chunk had overcome many difficulties, its abandonment so soon, was by many regarded as *primâ facia* evidence of a failure;—while the other has continued in operation, with short intervals, to the present time.

The Pottsville furnace was completed, and put in blast, on the 26th of October, 1839, under the direction of the celebrated Mr. Perry. This gentleman, who had frequently visited Mr. Crane, in Wales, and was familiar with the process adopted by him, declared that the performances of this furnace more than equalled those obtained by that gentleman. They were, therefore, esteemed as in the highest degree successful, and an intelligent irom master (Hon. Dr. Eckert,) who had observed its workings, declared that it had triumphed over difficulties and accidents, during the first fortnight of its existence, which would have chilled up any Charcoal works over and over again! The hearth was tapped night and morning, and the yield at each time varied from sixty to sixty-three pigs, equal to about three tons of metal. It is an all important fact, that in charging the stack, nothing but pure Anthracite Coal and iron-ore were used. Not a scrap of old metal, wood or Charcoal was used, except for the mere purpose of first ignition.

The erection of this furnace was mainly accomplished through the efforts of Burd Pat-

Table exhibiting the Properties, Dimensions, and Operations of the first Anthracite Furnaces erected in the United States.

No. of Furnace.	Name and situation of Furnace.	Name of Proprietor.	Name of Occupant.	When built.	Date of commencing Blast with Anthracite.	Dimensions of Stack in feet. Side of the base.	Height.	Diam. of Boshes.	Square of the Hearth.	Materials and yield per week, in tons. Ore.	Anthracite.	Limestone.	Pig metal produced.
						feet.	feet.	feet.	feet.				
1	Mauch Chunk,	Baughman, Guiteau & Co.	The Owners,	1838,	Aug. 27, 1838.	22	21½	5½	1 5-12				8
2	Pottsville,	Marshall, Kellogg & Co.,	Ditto,	1838,	July 10, 1839.	30	35	8¾	3½	68 7	31 2	31 2	28
3	Roaring Creek,	Burd Patterson & Co.,	Dr. Steinberger,	1838-9,	May 18, 1840.	30	30	8½		84	56	21	40
4	Phœnixville,	Reeves & Whitaker	The Owners,	1837,	June 17, 1840.	28	33	3	3 by 6½	73	59	24 1	28
5	Danville,	Biddle, Chambers & Co.,	Ditto,	1838-9,	April, 1840.	30	30	7½		70 3	46 8	35	35
6	Crane Iron Works, near Allentown.	Crane Iron Co.,	Ditto,	1839-40.	July 4, 1840.	30	40	12	3½	104	69 3	52	50
7	Columbia at Danville,	Geo. Patterson,	Messrs. J. P. & J. Groves.	1839,	July 2, 1840.	30	33	3½	3½	93 4	81 3	64 15	31 5
8	Montour at Danville, No. 1,	Biddle, Chambers & Co.,	The Owners.	1840,	July 11, 1841.	37	32	12	4	154	108	61 6	70
9	Ditto, No. 2,	Ditto,	Ditto,	1840,	August, 1841.	37	32	12	4				
10	Shamokin,	Shamokin Iron Co.	Ditto,	1840,		40	42½	12	4				
11													
12, 13, 14	Stanhope, N. J.,	Stanhope Iron Co.	Ditto	1840-1,	April 5, 1841.	30	30	10	3½	112 6	80 9	34 68	56

No. of Furnace.	Number and proportion of charges in 24 hours. Number of charges.	Ore.	Anthracite.	Limestone.	Air supplied to the Furnace. Cubic feet per minute.	Pressure in lbs. per sq. inch.	Temperature, Fahr.	Weight of air per ton of pig.	Number of tuyers used.	Blowing machinery. Number of blowing cylinders.	Diameter of cylinders.	Length of Stroke.	Number of strokes per minute.
		lbs.	lbs.	lbs.			degs.	tons.			inches.	inches.	
1					700	2	450	21 6	2	2	72	11	13½
2	20	100 scrap iron and 1100 ore	500	500	3769	1 5	600		3	2	40	72	18
3	28	960	600	254	2400	2 5	650	20⅛	3	2	44	60	11 4
4	31½	740	600	245	1732	1 5	700	20 8	3	2	42	48	11 25
5	25	900	700	443	2414	2 75	600	23 2	2	2	40	42	20
6	66	504	336	252	5065	2 5	600	34	3	2	60	72	10 75
7	28	1200	1050	800	1861	3	612	20 4	3	2	32	64	15⅝
8	44	1120	784	448	5026	4	612	24 8	3	4	40	72	16
9									3	4	40	72	
10									3	2	62	72	
11													
12, 13, 14	37	975	700	300	4071	3	600	25	3	2	72	72	13

No. of Furnace.	Water power employed. Height of wheel.	Length of buckets.	Depth of buckets.	Revolutions per minute.	Head and fall in feet.	Horse powers of wheel.	Steam power employed. Diameter of steam cylinder.	Length of stroke.	Revolutions per minute.	Number of boilers.	Length of boilers.	Diameter of boilers.	Pressure of steam per square in.	Estimated horse power.	Subsidiary Fuel. For steam power per day.	For heating blast, per ton, of pig.	Nature of ores used. Locality and character.	Yield per cent.
	feet.	feet.	inches.				inches.	feet.			feet.	inch.	lbs.		tons.	cwt.		
1	14	3½	3	13½	17												Hematite and magnetic of N. J.	40 to 70
2							15	6	18	8	20	30	125	80			Carbonate and hematite.	25 to 50
3	20	8	12	5 7	21	29 4										4	Fossiliferous peroxide of Bloomsburg.	50 to [illegible]
4	12 25	8	10	11½	14	15 1											Hydrated peroxide.	38 to 50
5							12	4	30	4	20	30	100	40	4	4	Calcareous peroxide of Danville.	45 to 60
6	12	25	21	3⅔	8	64 5										5	Hydrated peroxide near the works.	40 to 55
7							12	3½	25	4	20	30	100	40	3½	5	Calcareous, fossilliferous peroxide.	45 to 60
8							24	6	16	8	20	30	60	90		5	Fossil calcareous, & silicious peroxide.	33 to 60
9							24	6	20	8	20	30	60	90			Ditto.	33 to 60
10							22	6		10	30	30	70	160			Carbonate and Danville fossiliferous.	33 to 60
11																		
12, 13, 14	20	8		21¼												4½	Magnetic of Irondale.	50 to 70

terson, Esq., who, from the earliest history of this region, has been identified with every measure of its onward progress. He is still a resident of this Borough, and, as heretofore, stands connected with all new and praiseworthy enterprizes.

In January, 1840, the furnace having now performed successfully for three months, a deputation, consisting of the late Nicholas Biddle, Thomas Biddle, Isaac Lea, Jesse Richards, J. M. Sanderson, and Dr. B. Kugler, visited this Borough, to inspect the ironworks, and to award a prize of five thousand dollars, subscribed by certain influential citizens of Pennsylvania, to be presented to the individual who would, within a specified time, succeed in smelting a certain amount of iron ore, with Anthracite Coal, &c. This prize was accordingly awarded to the proprietor of the Pottsville Furnace, and therefore settles the question as to the person and place entitled to the credit of having first succeeded in this important enterprize.

The celebration of this event was a happy and brilliant affair, and it was not long ere the Union was filled with the importance of the achievment thus commemorated. The Committee were invited to a dinner at the Mount Carbon House, and a toast complimental to the distinguished gentlemen composing it, having been offered, Mr. N. Biddle responded to it in behalf of his colleagues, in a speech of great practical learning, and profound eloquence;—at the conclusion of which, he offered the following toast:

Old Pennsylvania—Her sons, like her soil —a rough out-side, but solid stuff within;—plenty of Coal to warm her friends—plenty of iron to cool her ememies.

The Pottsville Furnace was soon followed by another in the vicinity, called the Valley Furnace. This was put in blast September 17, 1841, and "succeeded admirably from the first moment of its action." It used the ore found upon the ground.

The within valuable table, which will exhibit the full particulars of each Anthracite furnace in the state, erected previous to 1841, (and which may be regarded as the *pioneer-works* in this country) is compiled from a highly useful work by Prof. Johnson, entitled *Notes on Anthracite Iron, &c. &c.*

At the latter end of 1842, after the passage of the Tariff act of that year, Anthracite furnaces began very rapidly to multiply. In the following year, they were found in full blast, and others going into operation, in almost every county in the State, where Coal and iron ore were at all accessible. The number continued annually to increase, at an astonishing rate, until very recently, when the duties levied upon all foreign iron having been greatly reduced in the subsequent law, it is deemed impossible, by many intelligent persons, intimately associated with our iron interests, for our manufacturers to successfully compete with those of Europe. The duties have been so much reduced, that our markets are virtually thrown open to the British manufacturer; —for with the present admirable, cheap and expeditious means of ocean navigation, and the comparatively low rates of duty,—the disadvantage in point of *distance*, is amply overcome by the great difference, between the two countries, in the prices of *labor*. Thus, the duty on a ton of English railroad iron, under the present Tariff law, is nine dollars, and the cost for transporting it to Boston is about five dollars—this being the only charge for crossing the ocean, foreign railroad iron can now be purchased, at long credits, free of all incumbrances, at from $45 to $48 per ton. Now, the prices of wages being much higher in this country than in England, railroad iron cannot be made at our manufactories for less than about $50 per ton,—while to transport it to Boston, from this State, would cost quite as much as it would from *Wales* to Boston—so that the only actual difference is in the items of *duty* and *labor*.

In estimating the value, therefore, of a ton of railroad iron, we must consider the amount of labor bestowed upon it,—and in doing this, we find that in this country, *labor* comprizes its entire *value*. The Coal and iron ore necessary to produce a ton of railroad iron is not worth more than about two dollars, as they are found in the ground;—it is the subsequent processes of mining and transportation which so greatly enhance their value. At the furnaces they undergo new transformations, and the product, arrived at the rolling-mill, is again subjected to various changes, until finally wrought into rails. Now, in tracing its history forward to this last and most important change, we find that *labor* has done the whole business, and it is labor, therefore, which is rewarded when it commands a fair and just price in market.

Under the former act, numerous manufactories of railroad iron were erected, in various parts of the country, at each of which from two to four hundred persons were employed. The wages, as we well know, varied from $1,25 to $3 per day, according to the particular work performed; and in one department, as high as from $6 to $8 per day was realized and justly earned. Now, although the the payment of such sums for labor, must matertally increase the price of the manufactured article;—yet it is a fact, well known, that our manufacturers furnished rails at less prices than did those of Europe previously to the passage of that act, when no railroad manufactories. had been erected in this country, and when it was deposited on our shores *free of duty*.

But it is not alone the absence of protection which cripples our manufacturers, and fills the market with the fruits of foreign labor;—it is the want of *stability*—the fluctuating and unsteady policy which has characterized our government of late years. Capitalists are justly timid in investing funds in any new enterprize, however promising; and to make themselves secure, their first step is to obtain *privileges* from the Legislature, which are not extended *generally* over the whole people.—Now, many persons dispute the right of government to extend privileges to any class of

men—believing that our Republican system should act by general, not by partial laws.—But when we reflect that, scarcely is a wholesome, consistent policy of government marked out, than a new administration takes possession of our Capitol and Legislative halls, and at once reverses the whole policy—changing "protection" to "free trade," and "advalorem duties" to "discriminating duties;"—it will be perceived how uncertain and precarious the manufacturing interests of our country are rendered. It is only by the combination of individual capital, and the union of all the facilities necessary for carrying on business on the most extensive scale, that our manufacturers can realize a fair, living profit. Individual enterprize is stifled;—it cannot withstand the powerful companies;—again, companies cannot withstand the foreign manufacturers;—when the crisis becomes insupportable, they must suspend operations—and now, let us inquire, who is it that suffer most?—the owners of the manufactory, or *those thus thrown out of employment*?

But the advocates of free trade tell us that we obtain foreign goods cheaper than we could ourselves manufacture them. This is not so. First, we raise the cotton, which is carried in bales to a commission merchant, who ships it to Liverpool at a profit. The shipper makes a profit for carrying it over the sea, and, arrived at Liverpool, the consignee makes a profit on storage, &c. It is now sold to the manufacturer, who converts it into goods; the goods are sent in packages to the merchant, who sends them to the ship, to be returned to this country. Arrived again on our shores, the manufactured goods change hands perhaps four or five times ere they reach those of the consumer;—and here we find that the greater *value* of the article is comprized in the proportion in which it has *travelled* and *changed hands*—like a traveller on a turnpike, the more gates he passes, the more toll he must pay. Now, would it not be wiser for us, who raise and consume all, instead of paying commissions and freights, and sending annually millions of our best currency abroad;—to retain the raw material at home, and thus give employment to our farmers,mechanics and laborers? The amount saved in commissions and freights would more than make up the difference in the price of labor; while a regular, consistent policy of government would give a sure, sound and true basis for the capital, and enterprise, and industry of the whole country. We do not throw out these brief hints because we entertain similar views as a politician;—we believe them to be essential, especially to our Coal and iron interests,—and when a fact is rendered thus plain, we can feel no personal sacrifice in honestly standing by it, without reference to mere partizan feeling.

We desired, more especially, to allude to the peculiar and important advantages enjoyed by this Region, over other sections of country, for the manufacture of every description of iron. It was, indeed, the appropriate theatre for the first successful operations of the Anthracite Furnace; and its claims for present and future consideration, in the same connection, cannot be thrown aside. There are several features associated here, of vast importance to the iron manufacturer, which could not possibly be combined elsewhere in the same high degree. These have been repeatedly pointed out by the editor of the Miners' *Journal*, and in casting our eye over successive numbers of that valuable publication, and observing the substantial arguments, and the persevering efforts of the editor to awaken the spirit of enterprize in the public, in relation to this interesting branch of business, we are astonished that so little has been done. The great and all-important matter is *Coal*. Important it unquestionably has proven itself to be;—yet iron ore may be called its twin brother; they repose in the same bed; the one subserves the other; and, in all respects, they are alike essential for the common uses of mankind. A recent writer in the *Journal* named, speaks as follows:

"The principal ore used in England and Scotland, is the carbonate of iron of the Coal measures; this ore yields from 30 to 33 per cent. of iron. It is found in strata or beds varying from 3 to 13 inches in thickness, and produces an iron of excellent quality. The following extract, taken from Dr. Ures' work on Arts and Manufactures, may not be uninteresting to the reader. After giving the analysis of some of the best ores from the English and Welsh Coal basins, he says: The mean richness of the ores of carbonate of iron of these Coal basins, is not far from 33 per cent.—about 28 per cent. is dissipated on an average in the roasting of the ores. Every ferigenous clay-stone is regarded as an iron-ore, when it contains more than 20 per cent. of metal; and it is paid for according to its quality. The ore must be roasted before it is fit for the blast furnace: a process carried on in the open air. A heap of ore mingled with small coal, (if necessary) is piled up over a stratum of large pieces of Coal; and the heap may be six or seven feet high, by 15 or 20 broad. The fire is applied at the windward end, and after it has burned a certain way, the heap is prolonged at the other extremity, as far as the nature of the ground or the convenience of the work requires. The quantity of Coal requisite for roasting the ore varies from one to four hundred weight per ton, according to the portion of bituminous matter associated with the iron stone. The ore looses in this operation from 25 to 30 per cent. of its weight. Three and a quarter tons of crude ore or two and a quarter tons of roasted ore, are required to produce a ton of cast iron; that is to say, the crude material yields on an average 30.7 per cent. and the roasted ore 44.4 of pig metal. In most smelting works in Staffordshire, about equal weights of the rich ore in sound nodules, called *gubbin*, and the poorer ore in cakes, called *blue flat*, are employed together in their roasted state; but the proportions are raised in order to have an uniform mixture capable of yielding from 30 to 33 per cent. of metal. To heat two and one-quarter

tons of roasted ore, which furnish one ton of pig iron, nineteen hundred weight of limestone are employed; constituting nearly one of limestone for three of unroasted ore per ton.

Until the year 1740, iron was made in England almost exclusively with charcoal, and prior to that period none of the iron stones of the Coal region were used; but as soon as the iron manufacturers found it necessary to locate themselves in the Coal region for the purpose of being convenient to the new kind of fuel that they were about to adopt, they found the necessity of searching for ore nearer their works than the magnetic ores that they had been in the habit of using were; the result was, that an abundance of excellent ore was discovered in the Coal regions in the immediate vicinity of their works, and although it did not yield so high a per centage of iron as the magnetic ores, they found it more profitable than transporting richer ores from a distance.

With regard to this region, a like result has been experienced; for it was not until after the erection of the furnace at this place, that any investigations had been instituted as to whether iron ore was to be obtained or not. But no sooner had explorations commenced than new and large deposits of iron ore were found daily, and the ore pronounced to be of an excellent quality. Mr. Benj. Perry, the intelligent Anthracite founder, has visited several of these mines, and gave it as his opinion that any number of furnaces could be supplied with ore for an indefinite time.

In comparing the ores of this country with those of England and Wales, we find the average richness of the ores nearly the same; but we have a decided and important advantage in the thickness of the veins, many of which being upwards of three feet thick, and from that down to six inches. The average richness of the ores taken from the Coal regions of England and Wales, is about 33 per cent. The average richness of eight specimens of ore, taken from the Pottsville Coal region, was 33.13 of metallic ore. These specimens were analysed under the direction of Prof. Rodgers, late State Geologist—some of them yielding 39, 38 and 37 per cent., and all taken from different veins. Prof. R. in his fourth annual report to the Legislature of this state, speaking of these ores, says: "Especial care has been taken to submit to chemical examination, such specimens *only* as represent the *average* character of their respective beds, —choosing those freshly opened in the mines, or in some deep excavation, and *rejecting*, as far as possible, samples gathered from the outcrop, or found loose on the surface; as they invariably contain too high a per centage to prove a fair criterion, &c.

The presence of inexhaustible supplies of coal and iron ore, suggests an important advantage in the comparatively limited capital necessary to carry on iron works. For while iron masters in other sections of country are compelled, at all seasons, to keep on hand a large supply of coal and ore,—no such necessity would exist here. Supplies could be procured in small quantities, as desired for immediate use, and the necessity of buying large quantities at *high prices*, is thus entirely overcome. The same argument holds good, as regards means of transportation, and speedy and cheap access to market. While iron works at many places have no avenue to market during the winter, and are consequently compelled to retain a large stock of their manufactured product on hand,—the manufacturer here could send it to market in such quantities, and at such times, as the prices might justify.

We may next consider the *cheapness* of the fuel, as well as of the ores used. For the former, the fine refuse Coal that has been crowding our mines and landings for years past, is now brought into use for generating steam, and heating the blast,—and besides answering admirably the purpose,—it is afforded free of charge, and delivered to the furnace, by the Coal operators,—so anxious are they to get rid of the large quantities annually accumulated about their premises. This, it will be granted, is an important consideration.

There is another consideration, with regard to those locations where the advantages of the situation consist merely in being in the immediate vicinity of the ore. After the smelting of the ore into pig metal is accomplished, no more ore is required;—but in the process of making bar-iron, about *four tons of Coal* are necessary to manufacture one ton of the latter,—so that, independent of the saving in the cost of making pig metal in the Coal region, the saving in converting it into bar-iron, at a large rolling mill, would be immense.

The Middle Anthracite Region, as we are assured by our friend, William F. Roberts, holds out inducements of the most favorable character for the investment of capital, in all the branches of iron making and iron manufactures. The Coal is of superior quality, and may be mined at very low rates. Its iron ore is rich and in abundance, while it has other important facilities for iron-making establishments to operate with the greatest economy and profit.

The lands of the Dauphin Coal Company, we may add, are also admirably calculated to sustain extensive iron establishments. Taking in view the admirable outlets to market, and the peculiar character of the Coal, and richness of the iron ore—they may be said to enjoy unequalled advantages for this branch of manufactures.

But our limits warn us from entering further into this subject, and we shall, therefore, conclude our remarks with the presentation of the following table, which will exhibit the iron trade of Philadelphia during the years specified, and indicate the importance of the trade of the entire state when the present tariff law went into effect. What it will be during the next two years, remains to be seen:

Iron Trade of Philadelphia:

	1847. Pig Iron and Castings.	1846.	1847. Wrought Iron.	1846.
By Ches. & Del. Canal, lbs.	88,131,239	63,324,093	18,058,491	18,669,843
Delaware Canal,	47,020,021	43,193,081	327,852	106,389
Schuylkill Canal,	15,963,480	9,219,840	8,442,560	2,408,000
Reading Railroad,	14,778,510	22,343,230	20,725,040	9,372,910
Columbia Railroad,	9,146,500	2,549,600	21,506,500	9,008,100
Norristown Railroad,	10,075,520	10,288,789	3,184,320	
Total,	185,115,270	150,918,633	72,244,763	39,565,242
Equal to, in tons.	82,640	67,392	32,252	17,681
	Nails and Spikes.		Blooms.	
By Reading Railroad, lbs.	8,743,480	7,251,670	1,537,330	2,459,060
Columbia "	7,213,700	21,500	1,323,300	7,251,670
Norristown "		1,741,792	89,600	
Ches. & Del. Canal,	1,634,877			
Schuylkill Canal,	1,966,720	1,612,800	3,339,840	
Total,	19,558,777	10,627,736	6,290,070	9,710,730
Equal to, in tons,	8,731	6,278	2,808	4,335
" kegs,	195,587	101,217		

We shall now resume the subject of Mining, and briefly allude to some of the principal improvements lately introduced.

In January, 1832, the Coal Mining Association of Schuylkill County, was formed. It was composed exclusively of master colliers, and those immediately concerned in the mining affairs of this Region; and the object was to collect and disseminate to and among the members useful information connected with the trade, and the practical operations of Mining. Upon its organization, Burd Patterson, Esq., was elected President; and John C. Offerman, Esq., Vice-President. Samuel Lewis, Esq., was elected Tresurer; and Andrew Russell and Charles Lawton, Esqs., Secretaries. The Board of Trade was composed of B. H. Springer; Samuel Brook; Samuel J. Potts; M. Brook Buckley; James E. White; Thomas S. Ridgway; and Martin Weaver. The officers were elected annually; and it was the duty of the Committee on Trade to report annually to the Association the state and future prospects of the Coal Trade of the Region. This was regularly done until last year, when no Report appeared.

The officers of the Association for 1847, (since which time none have been elected) were as follows: President, Thomas C. Williams, Esq.; Vice President, Francis B. Nicholls, Esq. (since deceased). Treasurer, George H. Potts, Esq. Board of Trade,—George H. Potts; T. C. Williams; A. Bolton; A. B. White; C. De Forest; John Pinkerton; J. G. Hewes.

After the introduction of railways, there seems to have been little done in the way of improvements, to facilitate the operation of mining. But without tracing, in regular order, the introduction of each new feature, as the present is contradistinguished from the past, we shall at once proceed to explain the *modus operandi* of mining, as observed in the present day.

In the first place, it may be necessary to premise that the *range* of all the Coal veins in the Schuylkill basin is East and West,—converging to the eastward, and diverging westward, with such slight variation from the general rule, as not to be worthy of notice. The *dip* of the veins is to the South; and their angle of inclination from the horizon varies from 30° to 40°, parallel, in all cases, with the surrounding strata. From 1833 the number of operations below water level have annually increased, in a regular per centage with the increase of the trade. As they are the most extensive, and would, perhaps, prove most interesting to the stranger, we shall now describe the minutiæ of which they are comprized.

When a vein of Coal is being worked below water-level, a steam engine and pumps are necessary to raise up the accumulated water in the mine; for *below* water-level means, simply, that the Coal is being mined at some point *below* the bed of the adjacent river, creek, or rivulet. The first step to be taken at the commencement of an operation of this kind, is to ascertain where the vein *crops out* to the surface, or so near to the surface as to be easily found, from a previous knowledge of the range of the vein. A favorable location must then be selected, twenty or thirty feet to the northward of the crop of the vein, for the location of a stationery steam-engine. This must be where a sufficiency of water can be had for the supply of the steam-boilers; and if not near to a main Railroad, prudence will dictate that it must be so situated that a branch or lateral road can be laid down near the place where the Engine is to be erected. The descent into the mine is called a *Slope*, and thus those mines below water-lever, called *Slopes*, are contradistinguished from those above water-level, called *Drifts*. Engines erected for the purpose of hoisting the Coal up the Slope, and pumping the water out of the mine, are usually of the capacity of from forty, fifty, and sixty horse-power, nearly all horizontal high-pressure engines, and working with a slide-valve. They are generally built in a very neat, simple, as well as a strong and efficient manner—invariably erected by the mechanics of the Coal Region.*

* The machinists of this county are not excelled by those of any other locality in the United States.—The principal establishments are those of Haywood & Snyder; John L. Pott; E. W. M'Ginnis; J. T. Werner; and one now being erected by Elias Deer,—all in Pottsville. In Minersville, William De Haven has an extensive establishment: in Port Carbon, Tobias Winterstein; in Tremont, P. Umholtz & Co.; in Tamaqua, Hudson, Smith &Taylor, besides several others of minor importance.

Some of these establishments receive orders from a distance for steam-engines and machinery—the superiority of which is well known and acknowledged. Thus, the machinery and engines for the entensive railroad mills at Phœnixville, Danville, and South Boston, Mass., were all erected by Haywood & Snyder—one of the most enterprising and respectable firms in this state,—the senior of which, in connection

The location of the engine being determined upon, a slope, or inclined-plane, must be driven down in the vein, and consequently at the same angle of inclination. The thickness of the vein is usually excavated, and the slope must be sufficiently wide to admit of two rail-way tracks, from thirty-six to forty inches wide each, to be laid down; with room, also, for the pumps on one side, (and sometimes both sides) and travelling road on the other side (or sometimes *between* the two rail-way tracks) for the miners and laborers;—the whole width of the slope being usually from eighteen to twenty-two feet. The slope is driven down about two hundred feet for the *first level*—at the bottom of which the *gangways* are commenced, running at right-angles from the slope, East and West in the vein, and are continued at distances discretionary with the operator, or to the extremity of his mining limits. The slope and the gangways form a capital-T. The gangways are frequently driven one, two, and three miles, with turn-outs at intervals for trains to pass each other. They are made about seven feet high, and sufficiently wide to admit a railroad track to be laid down, on which a well-loaded car, having from one to two tons of Coal, may pass freely. The cars are hauled to and fro by horses and mules—the latter being preferred, as well because of their diminutive size, as for their stamina. The gangways being driven in a sufficient distance from the bottom of the slope, the next thing is to commence digging out or *mining the Coal*. The Coal in the vein is left undisturbed on each side of the slope, to a distance of thirty or forty feet East and West, and extending all the way up to the surface—the Coal thus left, in mining phraseology, is called *pillars*, and is suffered to remain for the purpose of strengthening or supporting the slope; as, in an extensive mine, and in a good vein, its use may be required for a great number of years. A *pillar* of Coal of some twenty feet in width is also left all along the upper side of the gangway, and above this pillar, and up to the surface, all the Coal is worked out. The plan of working adopted by miners is this: two miners and a laborer usually work a *breast*, (like the swarth of a *cradler* in the harvest field,) usually from thirty to forty feet in width from the pillar above the gangway up to the surface. They make an opening from the gangway through the pillar above, about where the centre of the breast will be, of four or five feet wide, for a *shute;* after which the full extent of the breast is opened out, and the shute is continued up the centre, down which the Coal slides into a car in the gangway. When the Coal is dug out, the roof is supported by *props* of *timber*, placed at a distance from each other varying from six to eight or ten feet, as the roof may be found to be substantial or indifferent. The seams of Coal vary from two to twenty-five feet in thickness, (rarely exceeding the latter figure). Those of from six to ten feet are considered best, as they can be worked with greater facility and profit. They can be so propped and roofed as to enable the miner to take out every particle of Coal without the slightest danger of accident;—while those of greater thickness must be worked in *chambers*, and large *pillars of Coal* left standing to support the roof; and even then the miner is exposed to danger from the pieces falling continually down.

From ten to fifty of these breasts are worked simultaneously up to the surface; after which, if the gangway is far enough extended, new ones are commenced, and the same operation repeated, until all the Coal on that *level* is worked out. When this is done, the slope must again be driven down some two or three hundred feet; gangways again opened, railways laid down, and the same process of mining the Coal continued. And thus the miner gradually gets deeper and deeper into the breast of the earth, and to reward his industry and perseverance, Nature has provided the purest and best Coal low down, so that the farther down he ventures, the better and richer becomes his reward!

The deeper the mine, however, the more difficulty is experienced in keeping the works properly ventillated with fresh and wholesome air; and nothing but long practical experience can furnish a thorough knowledge of this very important branch of the mining business. We shall reserve some remarks which we intend to offer on this subject, for the conclusion of the present article.

Going, now, to the shutes in the gangway, we find cars loaded with Coal. A mule, which is in most cases used, will draw three or four of these loaded cars to the foot of the slope, where they are left, and empty cars hauled back, to be loaded. One of the loaded cars is then pushed upon a turning platform, by a person stationed there for that purpose: he places the car fairly for the railroad track in the slope, attaches the chain to it, draws the pull of the bell as a signal to inform those above that "all is ready," and it is hoisted up the slope by the engine, while an empty car descends, at the same time, on the other track. The car of Coal being now brought to the top, it is unhitched, pushed aside, and an empty car pushed into its place, hooked to the chain, and, a loaded car being now attached on the *other* track, the bell is again rung, and the empty car descends and the loaded one ascends, as before. This hoisting and lowering of cars is always going on with despatch during the day-time, and sometimes during the whole night—there being always two sets of hands and miners, one for the day and the other for the night. The time usually occued for bringing up a car is about one minute, which includes attaching to and detaching the car from the chain, &c. Where from one to two hundred tons of Coal are prepared and shipped daily, (besides the refuse and accumulated rubbish of the mine, which must be brought up) it will be seen that it forms one

---

with Messrs. Milnes & Co., is also extensively engaged in Coal mining, &c., and as a *practical business-man* he is at once the pride and boast of his fellow-citizens of Schuylkill county.—[Editor.

of the most *active* parts of the business—requiring regularity, despatch, and permanency in the machinery, and the strictest attention and skill in the hands. Accidents seldom occur; the only danger which is suggested to the stranger, is in the strength of the rope or chain. If this should break, as is sometimes the case, whoever may be at the bottom of the slope will be in imminent peril with his or their lives.

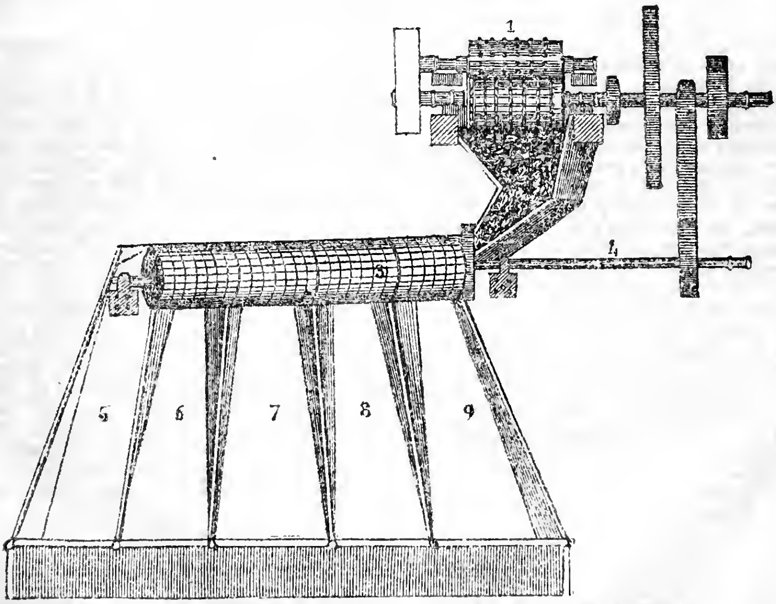
We now come to a feature in the process of preparing Coal, which has completely revolutionized the former plans and instruments —we allude to Coal Breakers.

Previous to 1844, Coal was broken almost entirely by hand—there was but one machine in use, invented by Aaron Vancleve, consisting of a horizontal plate, perforated with holes, and a *heavy roller* running over the Coal, which was laid on the plate. It was used nearly a year at the Beaver Meadow Mines, when it was thrown aside.

There had been two experiments tried at the mines of Charles Potts, in this county;—the first consisted of a hollow cylinder, with points, and an upright roller,—presenting something in the shape of a bark mill, or coffee mill, as, in fact, they are now called. The other consisted of spring-hammers, placed on a revolving cylinder, striking from the under side of the grate through the spaces, so as to strike the Coal laying upon it. Both of these were soon abandoned—plates having now come into general use. These plates had holes, so that as the Coal was broken it would fall through, while the larger pieces would roll over it. This was accomplished by hand, the instrument used being similar to that used for breaking turnpike stones. To break and screen three tons, was considered a day's work for one man.

On the 23th of February, 1844, Messrs. J. & S. Battin, of Philadelphia, started one of their Breakers at the mines of Gideon Bast, in this county. The Breaker consists of four rollers, two of which are on cylinders about thirty inches long and thirty in diameter, with projections or teeth about two and a half inches long, and four inches wide, from centre to centre. The cylinders are placed in a horizontal position, and are so geared with cogs, that they turn round at the top towards each other, and bring the teeth on each cylinder opposite to the spaces on the other. Above these are placed two other cylinders, with larger teeth and farther apart, geared and arranged in the same manner, which break the larger lumps of Coal before they are suffered to reach the lower or finishing cylinders.

FRONT VIEW OF COAL BREAKER.



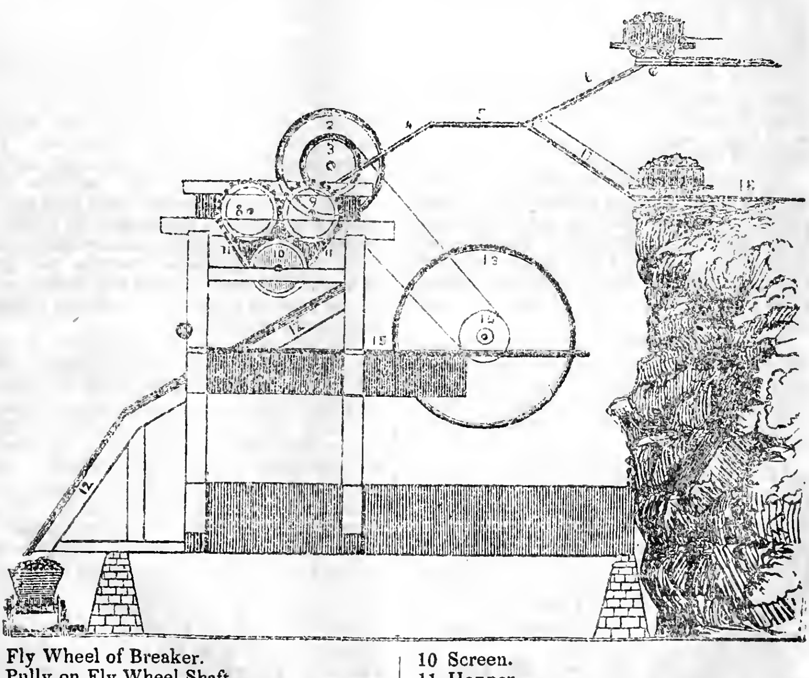
1 Batten's Breaker, beneath which Perforated do.
2 Hopper, receives the Coal after it is broken.
3 Screens, with apartments for various sizes Coal.
4 Shaft, attached to Screen

5 Shute, receives Large Coal.
6 " " Broken "
7 " " Stove "
8 " " Egg "
9 " " Pea "

The Breaker machinery is erected as near to the top of the slope as local circumstances will admit, and considerable elevation is necessary in order to break and prepare the Coal at as little expense as possible. The side of a hill is usually preferred, as a railroad to conduct the loaded car from the mouth of the slope to the Breaker can easily be constructed, and will thus avoid the expenses of ropes, &c. for an inclined plane, upon which to haul up the loaded cars. The Breakers are all turned by steam, with but a few exceptions. An engine of twelve or fifteen horse-power is requisite for driving the Breaker, and turning the circular screens, and they are built on the same plan as the larger engines for hoisting and pumping water. The Breaker rollers are of cast iron, placed in very stong, compact frame-work, and turned, as before stated, by means of a belt and gearing-wheels. The most approved rollers now in use, are those of Messrs. Haywood & Snyder—being perforated between the teeth, they are a decided improvement upon the solid periphery-rollers of the Messrs. Battin, inasmuch as there is less solid surface presented to the Coal in breaking, and, consequently, less *crushing*, and less Coal wasted in dirt.

The loaded car being brought to the head of the breaker, it is *dumped*, and the Coal spilled into a small shute, which conducts it into the Breaker. The Coal passes between and *through* the rollers, and thence falls into *circular screens*, which are made to revolve continually by the engine. The screen is so constructed and arranged, that the different sizes of Coal will fall into their respective apartments below (See engraving.) For instance: We imagine a screen twenty feet long,—in the first five feet, the holes of the screen are quite small; the next five feet the holes are larger; the next larger again, and the next still larger. This is the manner of the screen. When the Coal falls into the screen from the Breaker, it is in all sizes and shapes—but as it enters the cylinder it falls into apartments below, entirely separate from each other. Henry Jenkins, of this borough, has secured a patent for the manufacture of screens for this purpose. Previously

SIDE VIEW OF COAL BREAKER.



1 Fly Wheel of Breaker.
2 Pully on Fly Wheel Shaft.
3 Breaker Shaft.
4 Shute for conveying Coal to Breaker.
5 Landing.
6 Tip Shute from Rail-road.
7 Tip.
8 Solid Breaker.
9 Perforated do.
10 Screen.
11 Hopper.
12 Shutes for receiving Coal from Screen.
13 Fly Wheel for Engine.
14 Pulley on Engine Shaft.
15 Bed Plates for Engine.
16 Place for Boiler.
17 Inclined Plane.
18 Rail-road from Mines.

to the introduction of Breakers, the Coal was screened by hand. The screen was from 5 to 8 feet long, and from 1¾ to 2½ feet in diameter, and placed in a frame, slightly inclined. As the Coal entered the more elevated end, the screen was turned round by hand, like a grindstone. When Breakers were introduced, the screens, as previously, were constructed of bar iron, riveted on frame work. But great trouble and expense was experienced, from their liability to break, and the difficulty of repairing them, the whole work being necessarily stopped until this was accomplished. Mr. Jenkin's attention was soon attracted to this subject, and it was not long ere his mechanical ingenuity suggested a remedy. He accordingly invented a machine, by which the largest and thickest wire is wrought into shape suitable for weaving; and being woven together in frames about three feet wide, the frames are placed over a large cylinder, roundded, and joined together with strong rivets, and iron bars. The screen, thus complete, is removed from the bench, and joined with another of the same dimensions, but of larger or smaller nett-work. These screens are remarkably durable, and are not the least feature which have tended to bring Coal Breakers into universal use.

After the Coal leaves the screen, and falls into its appropriate shutes, railroad cars are hauled immediately along side the openings, which, being raised up like the wickets in a mill dam, the Coal falls out into the car, and when a sufficient quantity is obtained, the chute is closed, and then the Coal leaves forever the scenes of its past history, and is borne off to its future destiny.

The above principle can easily be made to break a ton of Coal per minute, and as before stated, has already made an entire revolution in the modes of breaking Coal. There are now about sixty of Battin's Breakers in use in the Coal regions, being nearly double the number of all other kinds,—of which there are some half dozen.

The within engravings *may* assist to give the reader a correct idea of the *modus operandi* we have been describing,—but we are satisfied they will *not* impress him very favorably with the present state of the fine arts in our country!

The size of chain generally used for hoisting Coal is three-fourths and seven-eights of an inch; formerly smaller chains were used, and, in fact, smaller engines and lighter machinery; but long experience and heavy bills of repairs, have taught the Coal operators that engines, pumps, gearings, chains, &c., &c., must be strong and substantial in order to withstand the incessant lifting and straining to which they are subjected.

Drainage.—We may now offer a few remarks in regard to drainage, and the plan of pumping the water out of mines. The capacity of the pump varies from ten, twelve, to fourteen inches. The working barrel is placed a little above the turning platform at the bottom of the slope, from which pipes are connected up to the surface, or near enough to the surface to have the water carried off.—Pump-rods are attached to the bucket in the working-barrel, and extend, of course, to the top of the slope, and are connected, by means of a large pump-wheel, with the engine.—Below the working-barrel, of the pump, and below the turning platform at the foot of the slope, a *Sump* is driven down, of the same dimensions as the slope, to the depth of some thirty or more feet. This forms a basin, into which the water of the mine collects from all the gangways and turnouts, and when the amount of water in the mine is not very great, it will be a considerable time in filling, during which there need, of course, be no pumping. In rainy seasons the water is sometimes rendered very troublesome in the mines, and it is therefore expedient to have the sump, and all connected with the pumping apparatus, in good order and constant readiness. Pipes are attached below the working-barrel and into the sump, and a connection being thus formed, the water is pumped out. The water is generally pumped out at times when the engine is not hoisting Coal, though it is often necessary, however, to hoist and pump at the same time. At some of the Collieries, two engines are used, one for hoisting the Coal, and the other for pumping up the water. Several hogsheads of water are thrown up per minute, with great ease and regularity.

Drifts.—In working a Coal mine above water-level, no engine or pumps are required. The drift is commenced on the surface, at the foot of a hill, where the vein crops out, and is driven through the vein in the same manner as described when below water-level. The mine being far enough in, gangways are extended to the right and left, and the Coal worked out upon the same plan as in slopes, when it is hauled to the breaker by horses or mules. As the gangway is above water-level, with a slight inclination towards the drift, of course the water will run out, thereby rendering engines, pumps, and pumping apparatus, wholly unnecessary.

Blasting is frequently resorted to, in mining, especially when working large veins. For this purpose the *safety-fuse* is used almost invariably—the Coal being generally so wet and damp that the ordinary processes of blasting would not answer, even if preferable in an economical view, which they are not. The safety-fuse, too, is perfectly safe, which gives it not the least important advantage. It is a species of fire-cracker, the principal part of the composition being powder, which is surrounded by a hempen fabric, and then covered with another composition, to render it water-proof, of which the greater part is pitch. In blasting Coal, it is difficult to keep the water from filling up the drill-hole,—but by inserting a piece of safety-fuse, and then fastening it tightly, no other preparations are necessary. The match is applied, and following the powder through the fuse, produces the desired result—affording ample time for the miners to withdraw, whenever desirable.

We perceive that a patent has recently been taken out in England, by G. Smith, of Cam-

borne, Cornwall, for an improvement in the safety-fuse, by which it is rendered less liable to deteriorate by exposure to dampness and water. This is effected, simply, by the application of a covering of *gutta-percha*, a species of caoutchouc lately introduced, and which promises to become very valuable in every branch of the mechanic-arts.

Faults.—The Anthracite Coal fields are, throughout, more or less faulty—the Southern region more especially. The seams of Coal having been heaved up, and at other places sunk down, their local positions—if we may so say—are very much, and in various ways, disturbed and contorted. A vein of Coal may be followed for half a mile when, gradually or directly, it is found to run out, and a mass of solid rock occupying its place, and rising up immediately *through it.* To get on the vain again, this rock must be tunnelled, at an expense varying from fifteen to fifty dollars per yard, and without knowing, positively, how far the tunnel must be extended ere the end can be accomplished. In cases like this, vast fortunes have been and are annually spent. Persons who have engaged in the mining business, and invested large sums in the erection of the necessary buildings, machinery, railways, etc. after getting fairly into operation, and while their success seemed complete, have struck one of these faults, and in a short time were thrown into utter bankruptcy. All their machinery is rendered comparatively idle, their regular business suddenly checked and deranged, and thousands of dollars going out of their pockets. Impressed with the belief, which seems to be invariable in such cases, that a few yards of tunnelling will again place them on the vein, they labor assiduously from day to day, and from week to week, entirely realizing—though not in the literal sense—the lines of Pope:

> Hope springs eternal in the human breast;
> Man never is, but always to be blest!

An instance just now occurs to us, wherein a Coal Operator having a cash capital of from thirty to forty thousand dollars, unexpectedly, in the course of a successful business, struck a rocky fault. He immediately commenced a tunnel through it, with the daily expectation that the task would very soon be completed. Every additional yard of excavation but increased his hopes, and when several hundred yards had been completed, he still daily and hourly expected to break upon the Coal. He labored until his means were finally exhausted. His Colliery establishment was exposed to sale, and as usual, but more especially in view of the above fault, whose extent was still involved in doubt, it sold for scarcely half its real value. The former owner retired, dispirited, exhausted mentally and physically, as well as *financially*. The new one took hold, rather distrustfully, it is true; but this did not long continue. A few days placed him on one of the richest and most productive veins of Coal in the region, and in a short time thereafter, this gentleman realized the ample fortune lost by his unfortunate predecessor!

There are, as we have said, various kinds of faults; in fact, although they may all have been produced by the same general agency, they vary in their particular character according to the different positions previously occupied by the strata. At some places a stratum of clay, or a combination of earthy substances, is interposed; while at others, no such obstacles appear—but the vein is broken off, and the dismembered portion *sunk down*—just as we can suppose a piece of glass, laying on several small rollers, and then suddenly broken into irregular fragments: some pieces would be comparatively large; some would no doubt nearly and quite join each other, while others would occupy various relative positions to the mass.

The reader will agree with us that Coal mining, under such circumstances, cannot but be an extremely hazardous and uncertain business; and, indeed, the experience of some of our most enterprising and intelligent Operators affords substantial proofs of the fact. There is no such thing as overcoming or avoiding, entirely, even with the best practical experience, the difficulties and dangers with which it is fraught; and as for *Scientific* knowledge, (properly so understood)—it is unquestionably of great value in a generel way: but cannot *always* avail in each particular case and locality,—for it is a truism that some of its most accomplished devotees fallen, contemporaneously and side by side, with their more unlettered rivals!

Ventillation, &c.—We now approach perhaps the most important, abstruse, and not the least interesting branch of the subject of Coal mining. In England thousands of dollars have been expended in experiments to arrive at a general system of ventillation; and volume upon volume of practical experience, and theoretrical essay, have been published. But a few years since, the columns of the English Mining journals were filled with these lucubrations; and the astounding number of persons annually destroyed in the mining regions, at last excited the attention of the government, and a series of investigations were instituted under its authority. The means proposed were various, and the wealth of a Girard might be squandered, ere any one theory could be rendered' practical, *per se*, in all Coal mining regions. The plan of ventillation must always, in a great measure, be governed by the nature of the Coal itself; by the situation and local position of the strata; by the arrangement of the workings, and various other considerations, which make one mine different from another.

From various data before us, and from the practical knowledge imparted to us in repeated conversations with friends in this region, we shall endeavor to present to the reader an *abstract view* of the whole subject—leaving for him, if his taste so incline, to add to the general stock, speculations and theories of his own.

The whole subject was recently taken up and reviewed by Prof. Ansted, of England, in the course of a series of Lectures at King's

College, on the Practical application of Geological Science to Mining. Though the published reports of these Lectures are of great length, we shall endeavor to present a brief outline of his remarks upon the subject under consideration,—which, though referring particularly to the Coal mines of New Castle, will nevertheless illustrate those of our own country.

* * * He stated that he should now confine his remarks exclusively to the phenomena connected with those accumulations of gas in Coal mines which caused explosions; and he selected this opportunity, partly because the subject arose naturally out of that of Ventillation in Coal mines, being also itself a distinct subject of the greatest possible importance, and also because public attention had been called to it, by the frequent explosions and the great loss of life which often accompanied them. The applicability of means to prevent these direful accidents was a subject of the greatest importance, as regarded the internal economy of the mine; and he should, therefore, have to consider the circumstances under which accidents of this kind might be expected to take place; the danger of explosion in Coal mines arose, no doubt, from issues of gas proceeding from the Coal itself. He had already had occasion to mention more than once the fact that gas was constantly given out by Coal; not only when exposed to heat, or unusual compression, but also under ordinary atmospheric conditions. When any one went into a Coal mine for the first time, they would probably notice a peculiar singing noise, which, though it was not easy to understand, there was no doubt arose from the issue of gas from the Coal. It was not known with certainty, whether this arose from the bursting of certain small vesicles in the Coal; or whether, in consequence of the pressure of the gas on the successive films of which the Coal was made up, the singing noise resulted from the gas coming out, as it were, in the form of a thin plate. Certain it was, that in Coal mines, there was this unusual noise, and that it was connected in some way or other with the presence of gas. The noise was heard unceasingly in mines of certain kinds of Coal, and in every such case, therefore, measures must be taken with regard to its results. The quantity of gas thus produced, varied, however, very much according to the nature of the Coal and the amount of atmospheric pressure, which appeared to be the two principal causes which regulated the issue of gas from the fractured surface of the Coal. In order to give some idea of the quantity of gas sometimes given out, he might mention, that in the Bensham seam, which was known to be a particularly fiery one, gas was thrown out so rapidly, and in such purity, that, by boring a little hole in the mineral, and applying a light, a jet flame would be produced.—In this case, the gas would be in too pure a condition to be explosive, because, to make it so, a certain admixture of atmospheric air was necessary. The quantity of gas thus given out naturally "by singing," from four acres of Coal, was ascertained, some time ago, to amount to ten thousand hogsheads per minute. Seams of Coal, however, varied very much in this respect, and some contained scarcely any gas at all. Besides this constant issue by singing, there was another way in which the gas was met with—namely, in what was called "blowers:" these were puffs of gas, sometimes taking place at long cracks, or at faults, and at others at mere holes; they were sometimes very common, and produced as much gas as served to light certain parts of the mine—as, for instance, the principal passages; and this, indeed, was the safest possible way of getting rid of it. In the Killingworth Mine there was a "blower," which had been burning for some years. In other instances, a fault was touched, which gave out gas, and when the same fault had again been pierced, it had produced no gas. Sometimes, as in the case of the Great Jarrow explosion, when the works approached near a fault, the pressure of the gas pent up in it had forced forward the Coal, which divided it from the mine, and involved all the workmen in certain destruction. These were all very difficult circumstances to deal with, as it was impossible to anticipate them. Besides these blowers, which occurred in the natural state of the Coal, there were constantly dangerous accumulations in portions of the mines which had been worked out, or partially worked, and in which the roof had partly fallen down. It was impossible to prevent these accumulations where the roof had fallen, and in old workings; and they were always, more or less, dangerous, because the gas was here inevitably mixed with atmospheric air, and generally in such proportions as to be highly explosive: they were also not uncommon in faulted districts—where the beds were in a broken state, the result of contraction, or pressure, at some remote period. In all these cases, accumulations of gas took place, and the gas was liable to burst forth on the smallest atmospheric change. If, for instance, a fall in the barometer indicated that the pressure of the atmosphere had become less, its existence would not be so great, and a quantity of compressed gas would be forced out by expansion. Gas being thus present in the mines, either in the body of the Coal itself, or in accumulated quantities, the danger arose from the fact, that it was impossible to conduct mining operations underground without lights.

The most convenient way of lighting, according to the miners, was by candles; and this, partly, because they were easy to carry about, and partly from long custom. There was a great prejudice in favor of candles, which they always would use where-ever it was possible. Now, it must be remembered, that generally part of the mine only was liable to the ordinary issues of gas, while other parts were subject to what might be called extraordinary issues, such as arose from unexpected accumulations. In the former case, the use of open lights would be perfectly safe, provided the general ventillation were tolerably good. Thus, it might be con-

sidered that, under ordinary circumstances such parts of the mine would be safe, and the other parts dangerous: and it was generally found, that if the workmen were allowed to use candles to the safe parts, they did not object to use lamps in the dangerous portions. But the condition of any district was always liable to be disturbed by new blowers commencing, or by the influx of gas from the dangerous districts; and, therefore, a vigilant superintendence of the state of the mine was indispensable. It was also necessary, if anything was to be done in the dangerous parts of the mine, that light should be obtained by safer means than by candles, because the smallest contact of flame was sufficient to explode certain mixtures of carburetted hydrogen gas and the atmospheric air. The explosive admixture was a mechanical one, and it was necessary to understand precisely of what proportions it was formed. If the gas came out pure, and a candle was thrust into it, the flame would be extinguished, because there was nothing to support combustion; the gas itself would take fire. If there were three parts of atmospheric air and one of gas, it began to be faintly explosive; and, when once explosive, it would set fire to other gas, which was too pure to explode. When the gas was as 1 to 6, it became very explosive, and continued so until the proportions were 1 to 10, when it became less explosive. The danger, however, was not destroyed until the mixture became weaker than 1 part of gas to 14 of air; after that it merely enlarged the flame of any light which might be brought into it, and turned it blue. The miner was thus enabled, by the lengthening of the flame of his light, and its appearance, to tell whether he was in a dangerous part of the mine, and the amount of gas that might be present in the atmosphere. If the flame reached to a certain height, the practical miner could tell at once how nearly the atmosphere approached an explosive combination, and with some other similar points affecting his safety, and that of his fellow-workmen, long habit had made him familiar.

There were several considerations of importance connected with these explosive admixtures of gas and air; as, for instance, the effect produced by the breathing of a number of men, which very much lessened the danger, by altering the proportions of nitrogen and oxygen in the atmosphere; and thus one portion of the mine would be less explosive than another, though both might contain the same proportion of carburetted hydrogen.

Every part of the mine which was capable of being worked, should, in all cases, be visited with guarded lights, before other lights were allowed to be taken; and the state of the mine should always be well ascertained before open lights were used. There was also a certain amount of danger in going into some portions of a fiery mine; and, until within the last thirty years, the only means of obtaining any degree of light in such cases, was by the use of an apparatus called the *steel-mill*. This was a very ingenious contrivance, by which a strain of sparks was produced by pressing a flint against a revolving plate of steel; and this afforded sufficient light to move about, but not enough to work by. It was, moreover, a dangerous contrivance—for, every now and then, there could be no doubt, a flame was produced, sufficient to explode gas under certain circumstances, and particularly if olefiant gas should be present, which, however, did not appear often to be the case in English mines.

About thirty years ago, a great number of serious accidents occurred in the mines of the north of England, following each other in alarmingly rapid succession. Very many lives were lost, and the public attention was much directed to the question whether or not some improvement could not be discovered in the way of lighting the mines. Sir Humphrey Davy, then in the zenith of his reputation, was applied to by Mr. Buddle, a well-known colliery viewer of that day, and invited to turn his attention to the subject. Humboldt had before attempted to overcome this difficulty; but his contrivance was only partially useful for visiting dangerous mines, as it would not burn longer than half an hour, the flame being supported by a reservoir of atmospheric air within the lamp. Dr. Clanny improved this lamp, admitting the external air freely in cases when it was used in an explosive state; but this lamp was practically useless, as the explosions which took place inside it soon put out the light.

The learned lecturer then proceeded to explain Sir H. Davy's invention. Its principle was founded upon the discovery, that the explosion of the mixture in question did not pass through small tubes; and after numerous experiments, Sir Humphrey Davy found, that the length of the tubes was of no consequence, but that wire gauze, the apertures being of the proper dimensions, answered the same purpose. By this means, all necessity for an exterior glass was got rid of, and the new lamp might be carried into the *most explosive* admixtures without danger. Such was the Davy lamp; and he believed that, as it was the first, it was also by far the best, real safety lamp that had been invented. It was, perhaps, not perfect, judging only by experiment, but it was decidedly the best for all practical purposes, as it was more manageable than any other, and not so easily put out of order. The gauze usually employed was made of iron wire, and it had seven hundred and eighty-four holes to the square inch. Sir Davy, having perfected his lamp, went down to the Newcastle Coal field, and, with Mr. Buddle, traversed with impunity some of the most dangerous parts of the Bensham seam, at that time the most fiery known. The Davy lamp had been used with great success ever since; and, though some accidents had occurred under circumstances in which no lights, but those of Davy lamps were present—it was as safe as any such instrument could be. The superiority of this lamp over more recent inventions consisted in its producing a greater quantity of light, and being more portable

with at least as much safety. Mr. George Stephenson, the engineer, had also invented a lamp, which was called a "Geordie," after the name of the inventor. It was, however, merely a modification of the Davy lamp, by the addition of a glass tube, which answered the double purpose of increasing the light and keeping the flame steady, by shielding it from currents of air. This, perhaps, gave it additional safety while perfect, as it was possible to drive an explosion of common street gas through the gauze of a Davy lamp. The glass, however, was liable to be broken, and then the instrument became a large and somewhat dangerous "Davy." In some of the Belgian mines a lamp, called "the Muesseler lamp," was in use, but it was a very complicated affair, and for that purpose was inferior to Sir H. Davy's invention. No doubt, it was safer theoretically, as by it the flame was extinguished the moment the lamp was taken into a dangerous atmosphere; but this very much lessened its utility, the main point being that the lamp shall give light with safety under such circumstances. The Davy lamp, with care, might be taken anywhere. He (the lecturer) had himself been in every description of atmosphere, and he had often seen explosions take place inside the Davy lamp by which he was lighted. This, indeed, was a circumstance which happened constantly to every viewer, over-man, and Davy-man in the Newcastle coal field. The true danger of the Davy lamp was one that would apply equally to any other, and it arose from the fact, that its constant use made the workmen careless, and the more it was used, therefore, the greater chance was there of accidents. The learned lecturer here exhibited a printed placard, setting forth the regulations which were adopted in several collieries, in respect to Davy lamps, the most important being that which enacted that no man should be allowed to use his Davy lamp until it had been examined carefully by the Davy-man, and pronounced perfectly clean and in good order, nor until it was securely locked, so that the workman could not take it to pieces, and expose the flame in an unguarded manner.

With regard to actual accidents, the profes sor remarked that he should not say much beyond placing before them the circumstances of a few of the most disastrous, which would serve to explain the nature of the results of the explosions of which he had explained the cause. The most important, then, that he should mention, occurred in the Haswell colliery, on the 28th September, 1844, when ninety-five lives were lost; and the next was that at the Jarrow Pit, on the 3d of Aug. 1845, when forty-one persons were killed. In the same year, thirty-six lives were lost at Killingworth; and in 1846, nineteen at Oldbury and thirty-six at Risca. By these accidents occurring within a period of little more than two years, upwards of two hundred persons lost their lives; and he had grouped these accidents together, in order to give an idea of the extent to which they occurred. There were, then, two hundred lives lost in two years, in working Coal mines, from accidents which, in the opinions of the juries who held inquests on the unfortunate sufferers, could not possibly have been prevented—the mines being in every case, except, perhaps, in that of the least considerable, in good condition at the time.

In the first of these accidents, that of the Haswell Colliery, there were under ground, at the time of the accident, ninety-nine persons, of whom four only escaped. It was an important consideration (which also applied to other accidents), whether it was absolutely unavoidable, the catastrophe having occurred, that all these people should be killed.—It might be that the whole matter was beyond human control, as in the case of a shipwreck. If we crossed the sea, the vessel, being made by human hands, was liable to accidents which might happen from stress of weather, which no one could help; or by carelessness, in respect of which some one would be culpable. If everything were done to render the vessel seaworthy, there would be no blame attaching in respect to its condition, though it should be wrecked in a storm; but, if the vessel were sent to sea in an unsafe condition, there was blame. Just so was it with regard to mines: if the mine were in as good a condition as science, and the adoption of the best plans could make it, no blame might be attributable to any one for an unforeseen accident. But, if it were possible so to manage the mine as to lessen the chance of accident —(he did not believe accidents could be entirely prevented); and if that were not done, then there would be blame. The sea must be crossed, despite of shipwrecks; and Coal must be had, let it cost what it might; the point was to get it under the most favorable circumstances. In the case of each accident therefore, it was important to consider whether everything was done by way of prevention and palliation which could be done. In the case before them, that of the Haswell Colliery, the accident occurred in a part of the mine where the pillars had been removed and the workmen were taking away the props. This was always a delicate operation, because, the props being removed, the roof fell, and the accumulations of gas were disturbed, and often shifted. Before proceeding further with the particulars of this melancholy accident, it would be necessary to mention the effects of an explosion upon the atmosphere. The carburetted hydrogen when exploded became decomposed; the oxygen in the atmosphere mixed with the hydrogen and formed water, and nothing was left to breathe but pure carbonic acid gas. This was a most poisonous gas, and produced instant death by choking. At least, insensibility was instantaneous; and, although in such cases, when measures were taken almost immediately, recovery had taken place, death was generally inevitable. The result of an explosion, therefore, was to turn the atmosphere into pure carbonic acid gas; and every man in that district of the mine, in which the accident occurred, was doomed to certain death. The Haswell Mine was divi-

ded into three great divisions, or three pannel workings; the explosion took place in the middle division, and thirty or forty persons, far removed from the scene of the accident, in another pannel, were poisoned by the after-damp. This could not have occurred had the ventillation of each pannel been as distinct as it might have been; and—he was, therefore, bound to say—as it ought to have been. The explosion at the Jarrow Pit, in Aug. 1845, by which forty-one persons were killed, was another instance where such a large destruction of human life was occasioned by the absence of two shafts; for the means of ventillation at the only one being destroyed by the accident, there was no means of restoring it previously to the mischief being done. Another interesting case occurred in the Killingworth colliery in 1845, which was the result of a fault. On one side of the district there was a long stone drift, at right angles to the main rolleyway of the pannel, in which the men were working; a fault was reached, and this gallery not prosecuted beyond it. The chief object was to drive through a mass of coal in order to get the ventillation completed, and for this purpose they were at work day and night. The fault was pricked in the course of the work in a succession of places, up to two or three days before the accident, which took place on a Thursday, without any unusual presence of gas being observed. On the Wednesday the fault was once more pricked, and no gas came out. On Thursday, one set of men had performed their allotted portion of work, and about two hours afterwards another gang of workmen descended; and it is singular that, though the gallery was considered so far dangerous that the men were working with Davy lamps, a boy was allowed to precede them with an open candle—a piece of carelessness most inexcusable, and for which they paid with their lives; before they reached the spot where the workings were, an explosion took place, and every person in the mine perished. Some idea of the force of these explosions might be deduced from the fact that on this occasion, a stopping consisting of thirty-six feet of rough materials, with an inch and a half brick wall on either side, was blown to pieces. In another instance, at the Jarrow mine, an accident happened, and on examining the mine afterwards, a cavity was found, in which there had been probably about two hundred cubic feet of gas in a very condensed state, and the side of the cavity being reduced by the working, it had given way, and let out the whole, which exploded with irresistible force. This was a kind of accident to which the miners were constantly liable, and which no vigilance could foresee or prevent. Accidents, and all their particulars, ought always to be recorded, and they could not be discussed too much. It was quite clear that, although it was impossible to avoid accidents, the risk was greatly diminished by good and effective systems of ventillation, and by unceasing care in the use of lights.

In continuation of this subject, we make the following extracts, principally from the recent valuable work of Mr. Taylor:*

* * The workmen of the Creuzot mine descended one morning, the one following the other, in rotation, into a shaft below, in which carbonic acid had accumulated during the night. Arrived at the level of the "bain," at a few yards from the bottom of the pit, the first fell, struck with asphyxia, without having time to utter a cry; the second followed immediately; the third saw his comrades prostrated on the ground, almost within reach of his arm; he stooped to seize them, and fell himself; another quickly shared the same fate, in his desire to save the others, and the catastrophe would not have been arrested had not the fifth been an experienced master miner, who obliged those who followed him to reascend.

The gazes which result from the subterraneous decomposition of the coal, have, besides carbonic acid, carbonic oxide, azote, sulphurous acid, and the carburets of hydrogen, which have a special odour. Before the coal takes fire, the interior air is already heavy and heated by the gaseous disengagements which are the precursers of ignition. As quickly as these symptoms are remarked, the coals already mined should be raised, and we should isolate from the surrounding air the region or the crevices which enclose the fire; employing at this work the laborers whose organization is known to be the best adapted to support the deleterious influence of these gazes.

Azote, or nitrogen gas, is much less to be dreaded than the carbonic acid; because its action upon the animal economy is less energetic: besides, its production can only take place by the absorption of oxygen from the air, and it does not naturally exist in the fissures or cavities of the rocks. It has, then, no spontaneous disengagement; but if we penetrate into the works which have been a long time abandoned, and where there has been combustion, the azote will occupy, in consequence of its lightness, the higher parts of the excavations, while the carbonic acid will occupy the lower parts; the respirable air forming the intermediate zone. Azote is found isolated in certain mines, where there exist pyrites in a state of decomposition; the sulphurets changing into sulphates, absorb the oxygen and isolate the azote; the sulphuret of iron is, in this respect, the most active agent.

Azote manifests itself by the red color of the flame of the lamps, which ends by extinction; it renders respiration difficult, produces a heaviness of the head, and a hissing or singing in the ears, which seems to indicate a mode of action different from that of carbonic acid.

The ordinary lamp of the miner is extinguished when the air contains no more than 15 per cent. of oxygen: [the atmospheric air is composed of 21 per cent. of oxygen and 79 per cent. of azote,] it is also at this proportion of 85 per cent. of azote that asphyxia or suffocation is caused.

* Statistics of Coal, &c.—upwards of 1200 pp.; elegantly illustrated with maps and engravings—price $5 Philadelphia: J. W. Moore.

Proto-carbonated hydrogen, or inflammable air, designated by the French and Belgian miners under the name of *grisou*, is of all the gases the most dangerous; that which occasions the greatest number of accidents, not by asphyxia, which it can nevertheless produce when it is not mixed with at least twice its volume of air, but for its property of igniting when in contact with lighted flames, and of exploding when it is mixed, in certain proportions, with atmospheric air.

The *grisou* is more abundant in the fat and friable coals, than in the dry and meagre coals; it particularly disengages itself in the crushed places, *éboulements*, in the recent stalls whose surfaces are laid bare, and that so vigorously as often to decripitate small scales of coal and produce a slight rustling noise. The fissures or fractures of the coal, and even the clefts of the roof or the floor, give sometimes outlets to *soufflards* or jets of gas. The action of this gas upon the flame of the lamps is the most certain guide in ascertaining its presence and proportion. The flame dilates, elongates, and takes a bluish tint, which can readily be distinguished by placing the hand between the eye and the flame, so that only the top of it can be seen. As soon as the proportion is equal to a twelfth part of the ambient air, the mixture is explosive, and if a lamp be carried, it will produce a detonation proportionate to the volume of the mixture. When, therefore, a miner perceives at the top of the flame of his lamp the bluish nimbus which decides the presence of the fire-damp, he ought to retire, either holding his light very low or even to extinguish it.

The chemical effects of an explosion are, the direct production of the vapours of water and carbonic acid and the separation of azote. The physical effects are, a violent dilatation of gas and of the surrounding air, followed by a reaction through contraction. The workmen who are exposed to this explosive atmosphere are burned, and the fire is even capable of communicating to the wood work or to the coal; the wind produced by the expansion is so great that, even at considerable distances from the site of explosion, the laborers are thrown down, or projected against the sides of the excavations; the walls, the timbering, are shaken and broken; and crushing, or falling down, is produced. These destructive effects can be propagated even at the mouths of the pits, from which are projected fragments of wood and rocks, accompanied by a thick tempest of coal in the form of dust.

The evil rests not there; considerable quantities of carbonic acid and azote, produced by the combustion of the gas, become stationary in the works, and cause those who have escaped the immediate action of the explosion to perish by *suffocation*. The ventillating currents, suddenly arrested by this perturbation, are now much more difficult to re-establish, because the doors which served to regulate them are partly destroyed; the fires are extinguished, and often, even the machines fixed at the mouths of the shafts, to regulate the currents, are damaged and displaced, to such an extent that it becomes impossible to convey any help to the bottom of the works.

—A great number of accidents have taken place on *Monday mornings*, when the miners descend after having quitted the mine on Saturday. M. Bischof reports that having visited a gallery which had been abandoned for several days, he found the gases liquated to such an extent that they were inflammable in every part of the area; detonating in the middle portion, while the almost pure atmospheric air filled the lower part.

It is very dangerous to allow these liquations to accumulate; it is necessary that the current of air be sufficiently active to produce immediately the diffusion of the gas in the air and its withdrawal out of the mine before the mixture has become explosive. But, notwithstanding the precautions of ventillation—*aérage*—many mines would be completely unworkable if there had not been found the special means of guarding them from the fire-damp—*grisou*. The coal beds most dangerous—as has been previously stated—are those which are the most valuable for their good qualities; science and industry have therefore been called on to seek the means of combating the effects of the grisou, and we proceed to expose those which have been successively employed:

Means to Check Fire-Damp.—The first idea which presented itself to the explorers was to disembarrass themselves of the gas by allowing the liquation to establish itself and by setting it on fire, so as to burn it, in the absence of the miners. For this purpose a workman, clothed in vestments of moistened leather, his visage protected by a mask with spectacles of glass, advanced, crawling on his belly, in the galleries where the fire-damp was known to exist, and holding forward a long pole, at the end of which was a lighted torch; he sounded thus the irregularities of the roof, the front of the excavations, and set fire to the grisous. This method, which has been employed, within twenty years, in the basin of the Loire, and even occasionally at the present day, in some of the English fiery collieries, has numerous inconveniences. The workmen, whom they called *pénitents*, were exposed to dangers to such an extent, that a great number perished. When the gas, instead of being simply inflammable, was detonating, the solidity of the mine was constantly compromised by the explosions; the fire attacked the coal and the timbers; the gases, which resulted from the combustion, became stationery in the works, and menaced the workmen with asphyxia; at length it became necessary, in certain mines, to repeat, even three or four times a day, this perilous operation, and yet it in no respect obviated the rapid disengagements which caused these numerous accidents. This method was equally in use in the English collieries; only the penitent or fireman, instead of carrying the fire himself, caused it to be moved by means of a slider placed over a line of poles connected together, and directed by a system of pullies and cords. The danger was thus diminished for the fireman, who retired into a

niche formed in a neighboring gallery; but in the mean time many were still overtaken, and, besides, all the other inconveniences remained.

The method called the *eternal lamps* was evidently better. It consisted in placing towards the top of the excavation, and in all the points where the fire damp collected, lamps constantly lighted, which burned the grison as fast as it was produced; the danger was diminished in a considerable degree, because there could not be formed such large accumulations of inflammable or detonating gas.—This mode of proceeding was, however, renounced in a great number of mines, on account of the production of carbonic acid and of azote; a production the more sensitive, since, to facilitate the liquation of the gases, the air ought not to be very strongly agitated.

At length it was devised to profit by the property possessed by platina in sponge to facilitate the combustion of the hydrogen with which it brought in contact, and pellets, composed of one part of platina and two parts of clay, were made, and were placed near the points at which the grison or fire-damp concentrated. But all these efforts, based upon the incited combustion of the inflammable gas, proved to be only dangerous and incomplete palliatives, which substitued for a great peril a series of other dangers, less imminent, doubtless, but equally distressing.

From that time all the well disposed continued to search for processes based upon another principle. Two only could conduct to a good result: 1. The withdrawal of the gases out of the mine; 2. a mode of lighting different from that which was in use, and which would suffice for the purposes of the miner without compromising his safety.

The principle of withdrawing—*entrainement*—of the gases by a rapid ventillation is, without contradiction, that which was the most natural to conceive; because it was already applied to all the other deleterious gases. Dr. Vèhrle proposed at first to effect the decanting of the gases by making the excavations (stalls?) communicate by ascending passages with a gallery embracing all the works, and uniting with an ascending shaft. But this project, otherwise impracticable, offered a remedy for only a part of these accidents; the execution alone of the necessary works could not have been made without the greatest danger, if these works had been undertaken in the coal; while, in the rocks of the roof, the expenses would have rendered them impracticable.—But a good ventillation alone could not suffice to place the miners in security; it was an excellent auxiliary means, but it always left unsolved this important problem: *the prevention of the inflammation of the gases which disengage themselves from the surfaces of the stalls.*

The lightning alone could conduct to the solution of this problem, and numerous attempts had been made, under this head, when Davy discovered the safety-lamp. Before him, they had operated with a small number of lights, placed in the lowest positions, and at a distance from the stalls; the workmen kept these lamps in view, and when the blue nimbus, the indication of hydrogen, began to show itself, they extinguished them or withdrew, covering them with their hats. They made use of, also, in the most infected mines, various phosphorescent matters, and particularly a mixture of flour and lime formed from oyster shells, called Canton phosphorous, although the uncertain and ephemeral light which these materials produced, was but a very feeble resource. At length it was observed that the proto-carbonated hydrogen was somewhat difficult of ignition, and that the red heat was insufficient to accomplish it; thus it was practicable to carry a red coal, or a red hot iron into the fire-damp without inflaming it, the white heat alone having the necessary temperature. They profited by this discovery by lighting the stalls by means of the steel-mill, previously described by Prof. Ansted, and such was the state of affairs when Sir H. Davy took up the subject, and commenced his brilliant experiments.

—From the foregoing the reader will have gleaned a true understanding of the nature of those accumulations in mines, which render ventilation a subject of such vast importance. The means adopted and suggested to prevent the explosion of these gases, are innumerable; and notwithstanding that the discovery of the safety-lamp, by which the presence of noxious gases can always be determined, has been a source of great moment and security, yet its use has not been effective in assisting to *expel* them, or of suggesting any certain method of ventillation, beyond the actual *discovery* of what *ought* to be expelled. It exhibits, infallibly, the actual presence of gases;—but it has not led to the means by which they can be dispersed and driven out: so that the very dangers which attended mining previous to its introduction, attend them now, and always will attend them until some means can be devised to drive them out of the mines as fast as they accumulate. A principle of ventillation, for example, that will answer the purpose during the summer season, would not answer at all, (in many cases, at least in our region) during the winter—notwithstanding the fact that a difference of but a few degrees occurs in the temperature of the mines, during the year. This, of course, arises from external causes, which must always govern the atmosphere of the mine. Thus, when the external atmosphere is varied, and suddenly changed by winds, lightning, frost, snow and long continued rains, the gases in the mine will be found to accumulate, to disperse, or to be borne out of the mine—as the case may be. They are always regulated by the density of atmospheric air, and rendered explosive just in proportion as they unite with it;—here the safety-lamp is useful, because however explosive the combination may be, it will conduct the viewer safely through it;—but, then, here is where *ventillation* fails, for the admixture cannot be disunited, or expelled, except in its own time and way.

The most general plan of ventillation adopt-

ed in this region is, simply, this: The atmospheric air is admitted at or near the mouth of the slope. After traversing the mine through every avenue, the current is drawn through an escape-hole, over which a furnace is erected, and a regular and intense heat kept up. The draft thus afforded (there being no other escape) is generally very strong, and as the current of air is borne along, it bears with it all the noxious gases in the mine. Whenever these gases accumulate in workings where the current of atmospheric air does not penetrate sufficiently, they are dispersed by the miners, by means of canvasses or banners; and when there is not sufficient air, boys are stationed with revolving fans, by which the air is kept comparatively clean. These, with like devices, varied as circumstances may suggest, are the means resorted to in the anthracite regions of this State. There is a viewer for each mine, who enters with a Davy-lamp, and always reports the actual condition of the mine before the miners go to work.

Desultory and concluding Remarks.—The mining population of our Coal regions is almost exclusively composed of foreigners—principally from England and Wales, with a few Irish and Scotchmen. The former have a decided preference for working in small veins, and they can use the pick in the narrowest space, right and left, and in all positions. They cannot, of course, swing it over their shoulders, or give it that *swing* which is deemed so necessary for effective work—but, holding it in front, and making short, quick strokes, the pick is as effective in their hands, in a space of three or four feet, (or even less) as it is in less circumscribed limits. This predilection of the English miners is principally attributable to the fact, that the coal veins of the English mining regions are usually thin, and having entered them at a very early age, they have thus formed a preference for thin veins, and a prejudice against large ones, where it is necessary to blast and use ladders, &c. Every miner carries his lamp on his cap, to which it is *hooked.* While pursuing their labors in the mines, they soon become thoroughly covered over with the black coal dust, and their clothes, which are of the coarsest fabrics, rudely patched together, are saturated with water. The mines are damp, and the floor usually full of coal-mud and water—hence the miners and laborers wear heavy coarse shoes, with the soles covered with *tacks.* Although extremely healthy as a class, the miners generally are pale and somewhat delicate in the face, and their eyes slightly protrude, and may be said to be *prominent.* Their features are not regular, and they cannot justly lay claim to manly beauty. They know little but what pertains to their subterraneous employments;—making that the subject of their discussions, their jest and their pastimes, they have little care for things concerning the *upper crust.* They are, to a certain degree superstitious: even the most intelligent of them yield to it. For example, it is considered an evil omen when a stranger, in entering the mine, *begins to whistle.* It produces a certain effect among them, and destroys, in a measure, their good spirits. A miner *never whistles*—and when, occasionally, they hum a tune, it is more of a soft and plaintive character than the popular songs of the day. The employment seems well calculated to indulge thought;—calm, complacent ideas. There is no wildness—no ambition—they seek only *contentment,* and are satisfied with their lot.

Visiters to the mines are cordially received, and every attention is shown them by the workmen. As a stranger would derive little satisfaction from his visit, unless he placed himself in the care of some one thoroughly acquainted with the mine, the workmen observe the old established custom of requesting every visiter to *pay his footing*—that is, the present of twenty-five or fifty cents (or a dollar or five dollars, if you like) to the person or persons who "show him the elephant." This request is generally made when the parties are the greatest distance from the slope, and when the visiters would naturally apprehend some difficulty in finding his way out! But, inasmuch as the conductor is withdrawn from his labor, and the visiter, without him, would be liable to get in the way of the workmen, and perhaps meet with some accident—besides his disability to understand the operations—the payment of the "footing" should never be neglected nor begrudged. The ladies, of course, pass free—the only charge being a *smile* or so.

The moral condition of the mining population of the Anthracite regions of this State, is vastly superior to that of the same class in any other country. They reside in rude cottages, it is true: and do not enjoy the same elegances of life which are obtained in many other industrial pursuits;—but they have abundance to eat, good clothes to wear, and *money in their pockets.* A more generous-hearted people—more devoted to their friends, and faithful in their domestic attachments, does not live. Upon their arrival here, where labor is usually plenty, the first fruits of their industry are carefully hoarded, and when a sufficient sum is gathered together, it is sent home to cheer and bless some kindly-remembered relative or friend. Thousands of dollars are thus annually sent off by the humble laborers of the Coal regions; and the fact illustrates the golden trait of our nature, which must in all time to come hide a catalogue of sins.

Strange are the incidents which sometimes occur in virtue of this noble impulse. Last year, we remember well, an honest and industrious miner, after several months' unceasing toil, had laid by a sufficient sum to pay the passage of his wife and several children from England to this country, besides a handsome sum for necessary expenses. The passage had been secured, and the money forwarded. The wife and her children in due time arrived—but, alas! where was the kind husband and father? In his *grave.* A day or two previously to their arrival, he had fallen at his work in the mine—a victim to an explosion of *fire-damp!*

The career of the miner, repairing daily to his subterranean workshop is, indeed, full of unfortunate streaks; dismal as solitude; black

as the earth he dolves. The scarred chieftain knows less danger, and much more glory.

But although the lot of the miner is little to be envied, it must be said, to the eternal credit of our country and its institutions, that it is here stripped of the odious features which characterize it in other countries. To exhibit the contrast between the mining districts of England and our own country, we have prepared the following items from the report of the investigating commissioners, appointed by the British Parliament, a few years ago. The degrading practice of employing children and females in mines, does not prevail here. Boys are employed to drive the horses, and to assort the coal as it descends into the shutes from the breaker—but these duties are light and suited to their capacity. Females, old or young, have never been engaged in the mines of this country;—(thank heaven, our countrymen appreciate them too highly not to offer them better *engagements* and more pleasant and appropriate *employment!*)

In 1841, the commissioners proceeded to investigate the condition of the laborers, male and female, in the mines of Great Britain. Of the number of children employed in the iron, coal, tin, and lead mines, it is difficult to ascertain, or to form any nice estimate—but the number must be very large. In many pits they are set to work at a very early age, some at six years, and at all ages beyond that. According to the evidence of Dr. Mitchell, the proportion of men to boys in the iron-stone pits of Staffordshire is one hundred to seventy; in the coal pits it is one hundred to 90. Many of these pits, especially the iron-stone, are low, and horses cannot be employed, which is the principal reason of there being so large a proportion of boys in comparison with the men, to push the skips or carriages to the foot of the shaft.

In some of the mines the improper and reprehensible practice of employing female children to perform precisely the same kind of labor as that performed by the boys, prevails. The practice of employing females in coal pits, says one of the commissioners, is flagrantly disgraceful to a christian, as well as a civilized country. "On descending Messrs. Hopewood's pit at Barnsley, I found assembled round the fire a group of men, boys and girls, some of whom were of the age of puberty, the girls as well as the boys, stark naked down to their wastes; their hair bound up with a light cap, and trowsers supported by their hips. Their sex was recognizable only by their breasts, and some little difficulty occasionally arose in pointing out to me which were girls and which were boys, and which caused a good deal of laughing and joking.

In the Flockton and Thornhill pits the system is even more indecent; for though the girls are clothed, at least three-fourths of the men for whom they hurry work are *stark naked*, or with a flannel waistcoat only, and in this state they assist one another to fill the corves 18 or 20 times a day. I have seen this done myself, not once or twice, but frequently. "Girls," continues the report, "from five to eighteen, perform all the work of boys.—There is no distinction whatever in their coming up the shafts, or in going down—in the mode of hurrying or thrusting—in the weights or corves, or in the distances they are hurried—in wages or dues. They are to be found alike vulgar in manner and obscene in language; but who can feel surprized at their debased condition, when they are known to be constantly associated, and associated only with men and boys, living and laboring in a state of disgusting nakedness and brutality; while they have themselves no other garment than a ragged shirt, or, in the absence of that, a pair of broken trowsers, to cover their persons?"

In the mining districts of Scotland, the employment of females in this description of labor, is generally considered to be so degrading, that "other classes of operatives refuse intermarriage with the daughters of colliers who have wrought in the pits."

The report of the collieries, etc. in the East of Scotland, by Mr Franks, contains correct and authentic information as to the condition of the laborers employed in them. The descriptions are illustrated by drawings, exhibiting the operations and position of the children in the mines. The following extract from his report will enable our readers to form a conception of the places and kind of work, devolving upon the children and young persons pursuing their several occupations:

"Many of the mines in the East of Scotland are conducted in the most primitive manner; the one horse gin to draw up the bucket, no separation in the shaft, the ventilation carried on in many places by means of old shafts left open, etc. The negligence of underground working corresponds with the above, the roads being carelessly attended to, and the workings very irregularly carried on, so that the oppression of the labor is as much increased by the want of good superintendence as by the irregularity of their work people themselves. The roads are, most commonly, wet, but in some places so much so as to come up to the ancle; and where the roofs are soft, the dripping and slushy state of the entire chamber is such that none can be said to work in it in a dry condition, and the coarse apparel the labor requires absorbs so much of the drainage of the water as to keep the workmen as thoroughly saturated as if they were working continually in water.

"The workings in the narrow seams are sometimes 100 to 200 yards from the main roads, so that the females have to crawl backwards and forwards with their small carts, in seems in many cases not exceeding 20 to 28 *inches in height.*"

In fact, says a very intelligent witness, (Mr. Wm. Hunter, the mining foreman of Ormiston Colliery) upon the occasion of being authorised to issue an order to exclude women and children from the colliery,—"in fact, women always did the lifting, or heavy part of the work, and neither they nor the children were treated like human beings, nor are they where they are employed. Females submit to work in places where no man or even lad

could be got to labor in; they work on bad roads, up to their knees in water, in a posture nearly double. They have swelled haunches and ancles, and are prematurely brought to the grave, or what is worse, a lingering existence." "In surveying the workings of an extensive colliery under ground," says Robert Bold, the eminent miner, "a married woman came forward, groaning under an excessive weight of coals, trembling in every nerve, and almost unable to keep her knees from sinking from under her. On coming up, she said, in a plaintive and melancholy voice, 'Oh, sir, this is sore, sore, sore work! I wish to God that the first woman who tried to bear coals had broken her back, and never would have tried it again.'"

Now, when the nature of this horrible labor is taken into consideration, the extreme severity, its regular duration of from 12 to 14 hours daily, and sometimes much longer; the damp, heated and deleterious atmosphere, in which the work is carried on; the tender age and sex of the workers; when it is considered that such labor is performed, not in isolated instances, selected to excite compassion, but that it may be regarded as the type of the every day existence of hundreds of our fellow creatures—a picture is presented of deadly physical oppression and systematic slavery, of which those unacquainted with such facts would not credit as existing in the British dominions.

We may add, as worthy of remark, that to this labor, which is at once so repulsive and severe, the girls are invariably sent at an earlier age than boys—from a notion very generally entertained amongst parents, that they are more acute and obedient.

VALLEY OF THE SCHUYLKILL.

The coal regions of Pennsylvania are admirably situated for commanding ready access to market. The north branch of the Susquehanna river runs through the Northern region, and uniting with the west branch near Sunbury, winds along the western terminations of the middle and southern regions; the Lehigh starts out in the northern termination, and the Schuylkill river issues from the middle of the latter region. These streams are connected by smaller ones, issuing from all directions; and while they do not always afford facilities for navigation, the valleys through which they are borne, almost invariably allow the construction of railways, and thus become auxiliary causeways to the three great outlets mentioned.

The valley of the Susquehanna, draining about thirteen millions of acres of land, will remain the principal thoroughfare for the agricultural products of the interior of Pennsylvania, and this trade must annually increase with the prosperity of the manufacturing interests of the eastern portion of the State, as well as that portion of Maryland approaching the Susquehanna near Tide Water. Of late years, the number of furnaces and rolling mills along the Susquehanna has greatly increased,—but in cotton manufactures no progress whatever has been made. The lumber trade still remains brisk, but as this diminishes the supplies of grain will increase, with the increase of manufactures towards the seaboard.

The Lehigh river, traversing a district of country rich in its agricultural and mineral products, is destined to become auxiliary, especially to the iron deposits, and the growing manufacturing interests of New Jersey.

But the Schuylkill, being the centre, must ever remain the principal avenue of the coal trade, and ultimately become the great emporium of manufactures—including, more particularly, those of iron and cotton. The soil drained by this stream is very fertile as it approaches Philadelphia, and its annual product is capable of supporting a vast population.—The numerous tributary streams afford abundant water-power for every desirable purpose, and especially for flouring mills, saw mills, etc. The locations for towns are throughout admirable and innumerable; and the local advantages for comfortable and attractive residences are not excelled elsewhere in any respect.—There are large deposites of limestone and iron-ore, at various places; and copper and lead are found in no inconsiderable quantities;—recent explorations confirming the belief that they will, at no distant day, be rendered objects of special importance to the enterprising capitalist.

A railway connecting the Susquehanna with the Schuylkill has long been projected, and there is some ground to belive will soon be carried out. When this object shall have been effected, a new impulse will be given to the trade of the Schuylkill, and especially to the business of the southern and middle coal regions. The great iron resources through, or near which the proposed route will pass, must ultimately render this county the principal theatre of the iron manufactures, as it now is of the coal trade of Pennsylvania; and while thus opening the way for other manufactures along the valley, will contribute vastly to the prosperity of the whole farming and active business community along this great outlet to the sea.

—We were led into the foregoing remarks as prefatory to a notice of the Schuylkill Navigation and the Reading railroad, with which we shall accordingly proceed. A recent writer in the Miner's *Journal* has furnished data, and we can do no less than avail ourself of it.

Schuylkill Navigation.—In 1847, this company essentially improved—in fact, entirely reconstructed their works. They widened and deepened the entire canal, so as to carry boats of 180 tons burden, and have reduced the number of locks from 109 to 71, 11 of which are guard locks without lift, of which the gates generally stand open, and are, in fact, closed only during freshets. The average time of passing a lock with a boat is about four minutes, at which rate all the locks on the canal could be passed in about five hours; or, making a reasonable allowance, six hours would give ample time to overcome the total descent of 620 feet—and if at every lock a descending

boat should meet an ascending one, the whole time lost in effecting the cross passage does not exceed 12 hours. This is an immense improvement over the old navigation.

Above the Blue Mountain nearly all the canals are almost equal in width to the slack-water pools formed by the dams. Below the Blue Mountain, the water line of the canal, which is never less than 60 feet, widens frequently to 100 feet and more. Taking these things in connection with the fact that about half the length of the navigation consists of wide slackwater pools, and it will be observed that in point of width every thing practically desirable has been attained.

The successful trips which have occasionally been made by boats propelled with steam, go to show the adaption of the new canal to this kind of navigation.

The length of the new navigation, is 108 miles—its lockage 620 feet—the burden of its boats 180 tons—the size of its locks, 110 by 18 feet—the width of its canals, never less than 60 feet—and the least depth of water upon the mitre sills 5½, and in the clear levels 6 feet.

A navigable route from the heart of the Coal Region to tide water, for boats carrying 180 tons is, therefore, now in full operation. The five leading rail roads, and their laterals, to the Navigation are the Mine Hill and Schuylkill Haven, terminating at Schuylkill Haven; the Mount Carbon, terminating at Mount Carbon; the Mill Creek, terminating at Port Carbon, and the Schuylkill Valley, terminating at Mount Carbon.

At Schuylkill Haven a very fine dock 900 feet long, 60 feet wide, and 6 feet deep, with its rail 17 feet high above water, shute and landings on both sides, has been constructed by Mr. Dundas. This dock alone is capable of shipping, in an active season's work, at least 250,000 tons of coal, and is leased by the Navigation Company.

At Port Carbon the Navigation Company have constructed an extensive series of landings. A part of these landings below the Mill Creek Railroad bridge, consists of a dock, about 900 feet long, 60 feet wide, and 6 feet deep, with its rail elevated 18 feet above water, with shutes and landings on both sides.—There is room at this landing for 30 boats of 180 tons burden to load at once, and is capable of shipping 500.000 tons of coal per annum.

In the pool of dam No. 1, the company have erected 6 new landings, with their rails elevated 16 feet above the water, and so arranged that 6 large boats may load at once, without interruption. In addition to these, and also in the upper dam, the Navigation Company have leased and fitted up the long dock, which accommodates 6 large boats at the same time. Thus the Company have 42 fine landings to ship coal coming from the Schuylkill Valley and Mill Creek Railroads, and capable together of shipping near 700,000 tons in a season's work.

In addition to the foregoing, the Company have constructed a dock and landings at Mount Carbon, similar to the Firth Dock at Port Carbon, and of about the same capacity.

Scranton Public Library

To avoid any possibility of a deficiency of water in dry seasons, the Navigation Company purchased a tract of land on Silver Creek, upon which an immense reservoir is in the process of construction, and which will be completed early in the coming autumn; this, added to the two Tumbling Run reservoirs of the Company, opposite Mount Carbon, cannot leave a doubt of the capacity of the canal to float her largest boats, with their freight, at all times. This reservoir is formed by throwing a mound of earth and stone across the valley of the stream, just above or back of Mine Hill. This dam will be nearly 40 feet high in the centre of the valley, and will raise the water to an elevation of about 890 feet above the level of the dam at Port Carbon, or 1510 feet above tide water. The bank and pond of the reservoir, will cover nearly 60 acres of land, and contain about 40,000,000 cubic feet of water—it will be of itself capable of locking down about 120,000 tons of coal annually.—The waters of the reservoir will be led down through three lines of cast iron pipes, 12 inches each in diamater, and being drawn in aid of the flow of the Schuylkill, during the one or two months of summer drought, will add to the capacity of the navigation very materially. Indeed, when we reflect that at all other times the flow of the Schuylkill alone is ample for any business, which single locks could readily pass, the great assistance which a reservoir of water equal to the lockage of 120,000 tons must give, will be evident to all. The distance of this reservoir from the head of the works, at Port Carbon, is about 7 miles.

The new depot for the shipments of Coal going down the Schuylkill Canal, called Red Bank, is situated on the Jersey side of the Deleware river, and the Coal-boats are towed over by steamboats. The lots, wharves, &c., are owned by a stock Company, and all the stock is already taken, and held at a considerable premium. There are nine wharves, at the ends of which there is fourteen feet of water, and over eleven feet at the lowest low-water mark. At each wharf five boats or vessels can load or unload at a time, and the whole is capable of shipping 800,000 tons of Coal when fully completed. Red Bank, we may add, is situated but a short distance from Gloucester Point, the thriving manufacturing town, which has but recently sprung up.

The Reading Railroad.—A brief history and description of this great public work may prove interesting to the readers of our little work, the information connected with which has mainly been derived from the weekly reports of its immense business.

The Railroad was projected in 1833, a charter obtained in 1834, surveys made the same year, and 41 miles put under contract and construction in 1835.

It was originally designed for its present purpose, an outlet or avenue to market for the Schuylkill Coal Region; but its first charter extended only to the city of Reading, 59 miles from its terminus on the Delaware River, near Philadelphia; as the right of constructing a Railroad between Reading and Port Clinton.

20 miles, had already been granted another corporation, the Little Schuylkill Railroad Company, terminating at the latter point.—From insufficient means, this company was unable to extend their road, and yielded their right and charter to the Reading Railroad Company, who, with a further extension of their charter, beyond Port Clinton to Pottsville, went into an active prosecution of the whole work, from Pottsville to the Delaware, 93 miles, under one charter, now known as the Reading Railroad.

Every Pennsylvanian is familiar with the great embarrassments to the business of the country, checking commercial enterprize, disastrous to every branch of industry, and fatal to public and private credit, during the period from 1838 to 1842. Notwithstanding all these difficulties, the friends of this road pushed steadily on with its construction, taxing their energies, their means and their credit to the utmost, to insure its speedy completion; and on the first day of 1842, the first locomotive and train passed over the whole line, between Pottsville and Philadelphia.

From that date to the present, its business, its revenue and its credit has increased, in a degree scarcely paralleled by any similar improvement, until its tonnage and its receipts are measured, as at present, by millions.

Two continuous tracks of railway extend the whole distance of 93 miles, from Mount Carbon, near Pottsville, to the Delaware river, three miles above the heart of the city of Philadelphia; with a branch also laid with a double track, 1½ miles long, connecting, by the State Road, with the principal business street of the same city, for the passengers, merchandize and city coal business. The rail used is of the H pattern, with both top edges alike; and weighs 45½, 52½ and 60 lbs. to the yard; the lightest having been first, and the heaviest last used. A few tons of other rails, purchased before a further supply of the pattern adopted for the road could be obtained in England, and varying from 51 to 57 lbs. per yard, are also in use.

The track is laid in the most simple manner, the lower web or base of the rail, being notched into 7 by 8 white oak cross sills, and these laid on broken stone, 14 inches deep and well rammed. This method is found admirably calculated for the enormous tonnage of the road, being rapidly and economically repaired and replaced, securing a thorough drainage, and preserving its line and level true, at all seasons of the year.

The *grades* of this road, are the chief elements of its success in revolutionizing public opinion, on the subject of the carriage of heavy burdens by railway. From the most important branch, Coalfeeder of the Road, at Schuylkill Haven, to the Falls of Schuylkill, a distance of 84 miles, the grades all descend *in the direction of the loaded trains*, or are *level*, with no more abrupt descent than 19 *feet per mile*. At the Falls, an assistant locomotive engine of great power pushes the train, without the latter stopping, or any delay, up a grade of 42½ feet per mile, for 1 4-10 miles, leaving it on a descending grade, within four miles of Richmond, whither it is readily conveyed by the same engine which started from Pottsville, never leaving her train.

The bridges on this line, are of great variety, in plan, and material of construction, stone, iron and wood. The most perfect and beautiful structure on the road, if not in the state, is a stone bridge across the Schuylkill near Phœnixville, built of cut stone throughout, with 4 circular arches, of 72 feet span, and 16½ feet rise each, at a cost with ice breakers, of $47,000. There are 75 other stone bridges and culverts, varying from 6 to 50 feet span; all of circular arcs, spanning water courses, branches of the Schuylkill and roads. There are seven bridges from 25 to 38 feet span each, built of iron, trussed after the "Howe" plan, with wrought iron top and bottom cords, wrought iron vertical ties, and cast iron diagonal braces. These bridges are stiff and light, and present a very neat and handsome appearance. As, however, the flooring is of wood, and therefore liable to decay and accident, they have only baen used where the width and depth rendered stone bridges impracticable; the latter being always used in replacing wooden structures, wherever it was practicable. There are 22 long wooden bridges, varying from 41 to 160 feet span, built on various principles, chiefly of lattice work, assisted by heavy arch pieces. Of this latter description, the bridge over the Schuylkill at the Fall is a fine specimen. It is 636 feet long, consisting of four spans of 134, two of 152, and one of 160 feet above the river. There is one bridge built on Burr's plan, with double arch pieces of 149 feet span; and one on "Howe's" plan, 156 feef span, also assisted by arch pieces. Besides the above, there are 28 wooden bridges of short spans, from 14 to 30 feet, built of King post, Queen post, 'Howe's truss,' and joists.

There are four Tunnels on the road. The longest of these is near Phœnixville, 1934 feet long, cut through solid rock, worked from five shafts and two end breasts; deepest shaft 140 feet; size of tunnels, 19 feet wide, by 17½ high; total cost, $153,000. Another tunnel at Port Clinton, is 1,600 feet long, worked from the two ends only; material, loose and solid rock mixed; 1300 feet are arched; depth below the surface of the ground, 119 feet; total cost $133,000. The Manayunk tunnel is 960 feet long, through very hard solid rock, worked from two ends; depth below surface, 95 feet; total cost $10,000. Another tunnel under the grade of the Norristown Railroad, and through an embankment of the latter, is 172 feet long, formed of a brick arch, with cut stone facades.

The Depots on this road are all substantially built, but with a view to use, rather than ornament. At Schuylkill Haven, three miles from Pottsville, is erected a spacious Engine house, round, with a semi-circular dome roof, 120 feet diameter, and 96 feet high; with a 40 feet turning platform in the centre, and tracks radiating therefrom, capable of housing sixteen second class engines and tenders. At Reading are located the most complete, ex-

tensive, and efficient workshops and Railroad buildings of every description to be found in the country. The Company's property covers here, besides the Railroad tracks, 36 acres, the greater part of which is in use for the various occupations required to keep this vast machine in life and motion. The main machine shop is 159 by 70 feet, filled with the most valuable tools and machinery, all made, with the exception of three or four lathes, in the Company's workshops, by their own mechanics. Other machine shops, one 87 by 40 feet, are used for fitting iron and brass exclusively.

The iron foundry is 164 by 82 feet, with 2 cupolas. The largest blacksmith's shop is 121 by 31 feet, 57 smith's fires being in daily use on the works, all blown by fans driven by steam. The main carpenter's shop is 140 by 46 feet, with a pattern shop in the second story.

The iron coal cars, tenders and smoke pipes are made and repaired in a shop 123 by 83 feet.

A merchandize depot just completed, is 124 by 84 feet, to accommodate that rapidly increasing branch of business. About a mile below the Reading depot, where the railroad is nearest the river, most efficient water works are constructed, consisting of a reservoir on the Neversink hill side, 51 feet above the rails, holding 700,000 gallons of water, supplied by a force pump, worked by a small steam engine. Attached to this station are also two separate tracks, with coal chutes beneath, 300 and 450 feet long each, for the use of the town; two wood and water stations; a small portable steam engine for sawing wood, a Refreshment house for crews of engines stopping to wood or water; a brass foundry, passenger car house, passenger rooms, offices, &c. &c. All the machinery of the main shops and foundry, is driven by a very handsomely finished stationery engine, with double cranks, of 35 horse power, built entirely on the works.

At Pottstown station, 18 miles below Reading, extensive and efficient shops have also been erected, chiefly for work connected with the bridges and track of the road, and new work of various descriptions. The principal shops here, are 151 by 81, 181 by 41, and 81 by 44 feet. The first shop is covered with a neat and light roof, built of an arched "Howe truss," forming a segment of a circle, 78½ feet span by 16 feet rise.

At Richmond, the lower terminus of the Road, at tide water on the river Delaware, are constructed the most extensive and commodious wharves, in all probability, in the world, for the reception and shipping, not only of the present, but of the future vast coal tonnage of the railway; 49 acres are occupied with the Company's wharves and works, extending along 2272 feet of river front, and accessible to vessels of 600 or 700 tons. The shipping arrangements consist of 17 wharves or piers, extending from 342 to 1132 feet into the river, all built in the most substantial manner, and furnished with chutes at convenient distances, by which the coal flows into the vessel lying alongside, DIRECTLY FROM THE OPENED BOTTOM OF THE COAL CAR FROM WHICH IT LEFT THE MINE. As some coal is piled or stacked in winter, or at times when its shipment is not required, the elevation of the tracks by trestlings, above the solid surface or flooring of the piers, affords sufficient room for stowing 195,000 tons of coal. Capacious docks extend inshore, between each pair of wharves, thus making the whole river front available for shipping purposes; 97 vessels can be loading at the same moment, and few places present busier, or more interesting scenes, than the wharves of the Reading Railroad, at Richmond. A brig of 155 tons, has been loaded with that number of tons of coal, in 180 minutes, at these wharves.

A very convenient and neat Engine House, is erected at this station; it is of a semi-circular shape, with a 40 feet turning platform in the centre, outside; from which tracks radiate into the house, giving a capacity for 20 Engines and their tenders of the largest class, the building 302 feet long on the centre line, by 59 feet wide. It is built in the simple Gothic style, the front supported by cast iron clustered pillars, from the tops of which spring pointed arches, and the whole capped with turretted capping. Immediately adjoining, are built spacious Machine and Work shops, for repairs of engines and cars, all under one roof, 221 by 63 feet. A visit to this chief outlet of the Pennsylvania Coal trade, will give the best idea of its magnitude, and of the various branches of industry connected with it.

The business of this road requires a large amount of Running Machinery. The latter consists of seventy-one Locomotive Engines and Tenders, including five in constant use on the Lateral Railroads in the coal region; 3020 iron and 1539 wooden coal cars; 482 cars for merchandize and use of road, and 17 passenger cars.

The Engines vary from 8 to 22½ tons weight; two very powerful engines, of 27 tons weight each, are used exclusively on the Falls grade, before mentioned. The iron cars weigh 24-10 tons empty, and carry five tons of coal. The average load of each engine, during the busy months of the year, is about 410 tons of coal, (of 2240 lbs.) The cost of hauling coal on this road, is about 35 cents per ton. Freight or merchandize, 75 cents per ton, and passengers 41 cents each through. Its GRADES have chiefly secured this great economy in transportation.

The total Length of Lateral Railroads, connecting with the Reading Railroad, under other charters and corporations, but all contributing to its business, using its cars, and returning them loaded with coal and merchandize, is about ninety-five miles. Some of these railroads are constructed in the most substantial manner, with the best superstructure at present used in the country.

By the monthly Reports which have been made of the business of the Company, it appears that the receipts from December 1st, 1845 to October 31st, 1846, were $1,707,312-25. The receipts for the remaining month of the fiscal year, which ended November 30th,

1846, swelled the gross amount to nearly $1,900,000. For the fiscal year of 1846–47, the receipts amounted to $2'333,659 22; and, estimating from the same ratio of increase, they will probably reach to the amount of $4,333,000, for the fiscal year of 1847–48.

Our Colliers can felicitate themselves in having between their mines and tide water, two transporting works by land and water, unsurpassed by any other railroads or canals in the world. It remains for them by a firm and prudent course to secure to themselves, and their customers, the full and free use of both these works, untrammelled by the quarrels, or jealouses of either.

Number of Engines, Cars, and Running Machinery upon the Philadelphia and Reading Rail Road; November 30, 1847.

Locomotive Engines.

46	First Class Engines.	
22	Second do. do.	(2 sold since last report.)
8	Third do. do.	
1	Second do. do.	(out of use at present—("Delaware.")
77	Total.	

Coal Cars.

	Weight, Empty.	Capacity.
1 Eight wheeled Iron Coal Car,	4.7	11.0
3,019 Four do. do. do.	2.43	5.0
1,318 do. do. Wooden do.	2.2	4.65
268 do. do. do. do.	2.05	3.2
4,606	2.34	4.79

Cars for Freight, and general use.

11	Eight wheeled		Covered House Cars.
32	Do.	do.	Box Cars.
48	Do.	do.	Open Platform Cars.
153	Four	do.	Covered House Cars.
28	Do.	do.	Box Cars.
230	Do.	do.	Open Platform Cars.
302	Total.		

Passenger Cars.

15	Eight	wheeled	Passenger Cars.
1	Four	do.	do.
3	Eight	do.	Baggage Cars.
2	Four	do.	do.
1	Four	do.	Express Car.
22	Total.		

In addition to the above, the Company own:

2 Small Express Locomotives, "Ariel" and "Witch."

2 Small Passenger Cars, for use of Road.

13 Stationary Engines, from 4 to 35 Horse Power, for Driving Machinery, Pumping at Water Stations, Sawing Wood, &c.

2 Portable Wood Cutting Steam Engines, at Reading and Richmond.

7 Snow Ploughs.

50 Horses, chiefly for hauling in Broad-street, Philadelphia.

Summary of Liabilities and Assets.

Liabilities.	*Jan.* 1, 1848.
Capital Stock,	1,503,550 00
Common Loans,	3,083,435 34
" " London Bonds,	604,800 00
Mortgage Loan,	946,803 56
Floating Debt,	340,075 36
Unpaid Dividends,	798 70
Arrears of Interest,	867,095 48
	7,346,563 44
Balance to the credit of Profit and Loss account,	291,633 86
	7,638,197 30

Assets.

Canal and River Improvements,	4,455,000 00
Lehigh and Susquehanna Railroad,	1,369,820 75
Real Estate, cost of Coal mine lands and other lands, Railroads to the Old Mines and Room Run Mines, and other improvements, Warves and Landings at Philadelphia, &c.	1,193,044 48
Moveable effects due the Company, Bonds and Mortgages, and other securities,	612,475 53
Cash on hand,	7,856 54
	7,638,197 30

Measures of Coal.

The coal bushel in England was formerly a metallic cylinder 19½ inches in diameter inside, and 7½ inches deep. In filling it, the coals were to be heaped six inches high in the middle, so that a line drawn from the apex to opposite sides of the bushel would be 11½ inches in each direction." This would give the contents of a bushel of coals equal to 2,725.4 cubic inches; while the bushel, imperial measure, of the same country, is 2,218.192 cubic inches; and one bushel, Winchester measure, is 2,150.42 cubic inches.

The chaldron of coals with "ingrain" measure 104,809.572 cubic inches; and without "ingrain" 99,809.64 cubic inches. The former would be 38.45 bushels, as measured in and on the cylinder above described, and the latter 32.95 such bushels. Eight chaldrons of coals in Newcastle, are equal to 15½ chaldrons in London. The chaldron in Newcastle weighs 53 cwt.; and, consequently, in London it weighs 27.35 cwt. The same authority which furnishes these data, also apprizes us that 88 pounds of coal make a bushel.

Importance of the Coal Trade.

The importance of coal, in a national point of view, need not be enlarged upon here; but the vital influence it has had on the prosperity of Great Britain, and certainly will have on this country, may be understood by quoting the opinions of a few of the many eminent British writers on political economy and statistics.

McCulloch says, "it is hardly possible to exaggerate the advantages England derives from her vast beds of coal;" that "our coal mines are the principal source and foundation of our manufacturing and commercial prosperity. Coal has been happily defined 'hoarded labor;' our coal mines have sometimes been called the *Black Indies*, and they have conferred upon us a thousand times more real advantage than the conquest of the Mogul Empire.

Mr. Porter says, that her "coal mines are the sources of greater riches than ever issued from the mines of Peru, or from the Diamond grounds, at the base of the Neela Mulla mountains;" that, but for the command of Coal, the inventions of Watt and Arkwright would have been of small account, &c.

The author of "Fossil Fuel" says, that coal, by the agency of steam, has enabled Great Britain to undersell the world in her manufactures.

Dr. Buckland, in mentioning the importance of coal, says that "amount of work done in England has been supposed to be equivalent to that between 3 and 400,000,000 of men by direct labor, and we are almost astounded at the influence of coal and iron and steam, upon the fate and fortunes of the human race;" that "the presence of coal is in an especial degree, the foundation of an increasing population, riches and power, and of improvement in almost every art which administers to the necessities and comfort of mankind, &c.

Mr. Page, in his evidence before Parliament, said, "The manufacturing interests of this country, colossal as is the fabric which it has raised, rest principally on no other base than our fortunate position with regard to the rocks, (carboniferous) of this series—should our coal mines ever be exhausted, it would melt away at once, &c.

Such opinions from these eminent writers should not surprise us, when we know that about 31,500,000 tons of coal, valued at the pit's mouth at $63,000,000, are annually mined for the use of twenty-six millions of inhabitants, or over one ton for each person in Great Britain, and there is no reason that an equally great production and consumption in proportion to the population should not, in due time, take place in the United States, if our home industry be as wisely fostered as that of England. Our 20,000,000 of people at present consume about 5,000,000 tons of coal; but the present rate of increase is such as to indicate a future consumption, twenty years hence, of at least 15,000,000; and as the population will then be over 30,000,000, this would be but half a ton to each inhabitant. But if the population increase as some staticians have calculated, in 1875 to 51,000,000, and we allow them the same proportionate consumption as now exists in Great Britain, we shall have a total annual consumption of 59,500,000 tons. And there appears to be no good reason for doubting the probability of such an increase; for the experience of the last twenty years has shown no calculations, however wild and extravagant they may have seemed, which have approached the condition of facts that is now before our eyes.

THE ELECTRIC TELEGRAPH.

Most wond'rous specimen of art,
With nature's laws combined—
Thou actest an enchanter's part,
Unrivalled in its kind.

United, at a moment's date,
Two distant spots we see;
Whilst time and space, annihilate,
Are set at nought by thee!

The fabled wonders, which of old
Our childhood loved to read,
Have scarcely equal wonders told,
To match thy lightning speed.

The waive of the magician's wand,
Makes distant scenes appear;
Whilst far-off lands, at thy command,
Obediently hear.

O'er miles and miles the message flies;
Yet surely it is said,
When, lo! the listener replies,
Before a moment's fled.

When shall thy new-found influence cease?
How far will it extend?
Shall not its curious power's increase,
Remotest nations blend?

Yet enemies thou need'st must find—
True merit raises spite;
Then think of the foes combined,
With which thou'lt have to fight.

Ambassadors, who'll be sent back
From every foreign nation,
With secretaries at their back,
All dying of vexation.

The Post-office destroyed will be;
For, where's the use of writing—
When back the answer comes by thee,
Whilst queries we're inditing?

Let's have a talk, then, quite at ease,
And gossip while we may;
Let's chat a while with the Chinese,
And jest with Paraguay.

We'll ask a riddle in Peru,
Tell tales at Ispahan—
Just speak a word in Timbuctoo,
And whisper with Japan.

As round the world thy influence rolls,
For one, I shall not wonder,
To find, through thee, the very Poles
Cannot be kept asunder.

NOTES AND STATISTICS OF THE PENNSYLVANIA COAL TRADE.

Coal, observes an anonymous writer, is evidently a result of the decomposition of the compound of bodies from which it is obtained. It consists of the greatest part of the earthy principle of these compound bodies, with which a part of the saline principle, and some of the phlogiston of the decompcsed oil, are fixed and combined very intimately. Coal can never be formed but by the phlogiston of a body which has been in an oily state; hence it cannot be formed by sulphur, phosphorus, metals, nor by any other substance the phlogiston of which is not in an oily state. Every oily matter treated with fire in close vessels, furnishes true coal; so that, whenever a charry residuum is left, we may be certain that the substance employed contains oil.

The inflammable principle of coal, although it proceeds from oil, certainly is not oil, but pure phlogiston, since coal added to sulphuric acid can form sulphur; to phosphoric acid, can form phosphorus, &c., and since oil can produce none of these effects till it has been decomposed and reduced to the state of *coal.*— Besides, the phenomena accompanying the burning coal are different from those which happen when oily substances are burnt. The flame of charcoal is not so bright as that of oil, and produces no flame or soot.

All the phlogiston of coal is not burnt in the open air—particularly when the combustion is slow. One part of it exhales without decomposition, and forms a vapor, or an invisible and insensible *gas.* This vapor, (which is, or at least, contains a great deal of fixed air) is found to be very pernicious, and to affect the animal system in such a manner as to occasion death in a very short time. For this reason it is dangerous to remain in a close room or place where charcoal or any other sort of coal is burnt. Persons struck by this vapor are stunned, faint, suffer a violent headache, and fall down senseless and motionless. The best method of recovering them, is, simply, timely exposure to the open air, and by making them swallow vinegar and breathe its steam.

Among coals, considerable difference is observable, which proceeds from difference in the bodies from which they are made; some coals, particularly, are more combustible than others. This combustibility seems to depend on the greater or less quantity of saline principle they contain—that is, the more of the saline principle it contains, the more easily it decomposes and burns. This difference in coal varies in about the same proportion that the difference in the properties of various kinds of wood varies when exposed to fire. The difference in coal, unlike that in wood, relates also to the localities where it is found—it is therefore, rarely that the opposite extremes of its analytical properties are united in the same spot. We append an analysis of these two extremes—the first being that of the purest and best coal, and the latter, the inferior, and least valuable.

Analysis of Anthracite.

1	Carbon,	90 per cent.
	Volatile matter,	6½ do
	Ashes,	3½ do
		1.00
2	Carbon,	77 per cent.
	Volatile matter,	11 do
	Ashes,	12 do
		1·00

This difference in the quality of coal is again perceptible in reference to its *weight.* We append the following, which will exhibit the character of our anthracites according to the weight of each respectively, per cubic yard.

WEIGHT OF ANTHRACITE COAL.

First, or Schuylkill Region.

Localities proceeding from West to East.	Weight of a cubic yard in lbs.
Lyken's Valley.	2224
Stony Creek, 6 mile openings,	2244
Big Flats,	about 2351
Rausch Gap,	2453
Lorberry Creek,	2484
Pottsville,	mean 2504
Tamaqua, Vein N.	2700
Lehigh, Mauch Chunk,	2615
Do Nesquehoning,	2646

Second, or Middle Region.

Localities proceeding from West to East.	Weight of a cubic yard in lbs.
West Mahanoy Coal,	2313
Hazleton,	2615
Girardville,	2700
Beaver Meadow,	2700

The Pennsylvania Anthracite appears to be altogether heavier than the European, as will appear from the following:

European.

South Wales (Swansea,)	2131
France, (Grenoble,)	1809
Black Spring Gap,	2351

Pennsylvanian.

Wilkesbarre, (Baltimore co.)	2484
Pottsville,	2649
Tamaqua, heaviest,	2808

OFFICIAL REPORT OF THE PENNSYLVANIA ANTHRACITE COAL TRADE,

From its commencement in 1820, to the close of 1847: showing the receipts from the various mines, the total supply and the annual increase of the Trade.

	LEHIGH.							SCHUYLKILL.			OTHER REGIONS.								
YRS.	LEHIGH.	BEAVER *Meadow*	HAZLETON.	SUGAR LOAF.	BUCK *Moun'n*	SUMMIT	TOTAL.	CANAL.	RAIL ROAD.	TOTAL.	LACKAWANA	PINE-GROVE.	SHAMOKIN.	WILKES BARRE.	AGGREGATE.	ANNUAL INCREASE.	CONSUMPTION.	UNSOLD APRIL 1.	SOLD ON CANAL & R. ROAD
1820	,365						365								365				
1821	1,073						1,073								1,073				
1822	2,240						2,240								2,240				
1823	5,823						5,823								5,823				
1824	9,541						9,541								9,541				
1825	28,393						28,393	6,500		6,500					34,893	25,352			
1826	31,280						31,280	16,767		16,767					48,047	13,154			
1827	32,074						32,074	31,360		31,360					63,434	15,837			3,154
1828	30,232						30,232	47,284		47,284					77,516	14,082			3,372
1829	25,110						25,110	79,973		79,973	7,000				112,083	34,567			3,332
1830	41,750						41,750	89,984		89,984	43,000				174,734	62,651			5,321
1831	40,966						40,966	81,854		81,854	54,000				176,820	2,086	177,000		6,150
1832	70,000						70,000	209,271		209,271	84,600				363,871	187,051	298,871	none.	10,048
1833	123,000						123,000	252,971		252,971	111,777				487,748	123,877	434,986	65 000	13,429
1834	106,244						106,244	226,692		226,692	43,700				376,636	DECREASE.	415,186	117,762	19,429
1835	131,250						131,250	339,508		339,508	90,000				560,758	184,122	635,935	79,212	18,571
1836	146,562						146,522	432,045		432,045	103,861				682,428	121,670	632,428	4,035	17,863
1837	192,320	33,617					225,937	523,152		523,152	115,387	17,000			881,476	199,048	680,441	54,035	21,749
1838	159;564	38,426	16,221				214,211	433,875		433,875	78,207	13,000			739,293	DECREASE.	788,968	255,070	28,775
1839	142.071	38.429	34.000	7.550			221,850	442,608		442,608	122,300	20,639	11,930		819,327	80,034	867,000	205,395	30,390
1840	102,183	43.619	50.366	29.039			225,288	452,291		452,291	148,470	23,860	15,505		865,414	46,087	973,136	157,622	28,924
1841	*78.164	*26,232	*21.263	17.170			142,821	584,692		584,692	192,270	17,653	21,463		958,899	93,485	958,899	100,000	41,223
1842	163,762	45,422	31.012	*31.930			272,129	491,602	49.290	540,892	205,253	32,381	10,000	47,346	1,108,001	149,102	1,158,001	100,000	40,584
1843	138.825	54,729	44.579	26.814	2.844		267,734	447,058	230,237	677,295	227,605	22,905	10,000	58,000	1,263,539	155,538	1,263,539	50,000	34,619
1844	219,245	70,479	73.615	2·866	13.749		377,821	398,443	441,491	839,934	251,005	34,916	13,087	114,906	1,631,669	368,130	1,631,669	50,000	60,000
1845	257,740	77,227	70.266	1.843	23.814		429,492	263,559	820,237	1,083,796	273,435	47,928	.10,000	178,401	2,023,052	391,383	2,023,052	50,000	90,000
1846	274.623	85,648	98.150		46.103	17.773	522,989	3,440	1,233,562	1,237,002	320,000	58,926	12,572	192,503	2,343,992	320,940	2,343,992	50,000	155,460
1847	334,929	109,110	105.639		50.847	†43.086	643,973	222,693	1,360,681	1,583,374	388,203	67,457	14,904	284,398	2,982,309	638,317		50,000	226,610
							4,360,108	6,077,622	4.135,498	10,213,120	2,857,133	349,665	109,461	875,553	18,793,602				

* Great Freshet which injured the Canal. † 10,247 tons from Wilkesbarre.

TABLE SHEWING THE COMPARATIVE DISTANCES FROM THE COLLIERIES,

BOTH ANTHRACITE AND BITUMINOUS, IN THIS AND ADJOINING STATES, TO TIDE WATER AND THE PRINCIPAL MARKETS.

LOCALITIES OF COAL MINING STATIONS.	Miles frm the Mine.	ROUTE DETAILED.	DESCRIPTION OF COAL.
TO TIDE WATER *From Stony Creek Coal Region.*		AT HAVRE DE GRACE.	
Port Lyon or Dauphin, : :	80	Harrisburg 8, Middletown 9, Columbia 18, Havre de Grace 45	South coal region.
West point of Short mountain coal,	82	To Dauphin 2, Penna. Canal 35, Lockage 94 feet; Tide Water canal 45, 29 locks, 233 feet lockage.	Bituminous.
Six mile coal openings, : :	86	Dauphin 6, Penna. Canal 35, Tide Water canal 45.	Do
Big Flats mines,	89	Do 0 do do	Do
Rattling Run Mines, : : :	93	Do 13 do do	Do
Yellow Springs mines,	96	Do 16 do do	Do
Cold Spring central openings, :	98	Do 18 do do	Do
Rauach Gap mines by Stony Creek,	101	Do 21 do do	Do Transition.
Do. crossing 2nd mountain to Big Dam,	108	Rail road $3\frac{1}{4}$, Union canal $41\frac{3}{4}$, Pa. 18, Tide Water canal 45	Do
Do. by Fishing Creek to Port Mifflin,	110	Do 10 do $46\frac{1}{2}$ do 18 do 45	Do
Do. by Indian Creek Gap, :	99	Do 10 do 26 do 18 do 45	Do
Gold Mine Gap by Stony Creek,	105	Do 25 do 35 do 45	Anthracite.
Do. by Fishing Creek, . : :	115	Do $6\frac{1}{2}$ do $46\frac{1}{2}$ do 18 do 45	Do
Black Spring Gap by Stony Creek,	106	Do 26 do 35 do 45	Do
Do. by Fishing Creek, : :	114	Do $7\frac{1}{2}$ do $46\frac{1}{2}$ do 18 do 45	Do
Lykens Valley mines,	116	Do 16, Wo. Feed. & Pa. can. 55 do 45	Do
Bear Valley mines by Wiconisco Feeder,	125	Do to Millerstown 26, do 55 do 45	Do
Do. by Mahantango Creek, :	135	Do 10, Slackwater 17. Havre 108	Do
Do. by Schuylkill Cy. and Stony Creek	120	Do 15, Stony Creek Railroad 25, Canals 80	Do
West Mahanoy mines, : :	126	Do 26, Feeder 12, Canals 88	Do Middle coal region.
Swatara coal district--Lorberry Cr. Big Vein,	120	Do 5, Union canal 52, Penna. canal 18, Tide 45	South region.
Do. by Fishing Creek Gap, :	117	Do 7, Union and Tide canals $109\frac{1}{4}$	Do
Swatara coal district by Stony Creek,	111	Do 31, Penna. canal 35, Tide 45	Anthracite.
Do. Good Spring Creek, : :	$121\frac{1}{2}$	Do 12 do $46\frac{1}{2}$, Havre 63	Do
Wyoming coal fileld—Plymouth mines,	186	Pennsylvania canal 141, Tide Water 45	Do North region.
Do. Wilkesbarre mines, : :	193	Railroad 2, do 146, do 45	Do
Do. Lackawannack,	200	Pennsylvania canal 155, do 45	Do
Shamokin mines, : : :	143	Do 15, Dauphin 48, Havre 80	Do
Alleghany coal—Loyolsock,	172	Railroad 15, Canals 157,	Bituminous.
Lycoming Creek mines, : :	196	Do 25 do 171,	Do
Farrandsville,	202	Do 1 do 201,	Do
14 miles above Dunnstown, : :	208	Pennsylvania canals 163, Tide Canal 45	Do
Mouth of Sinnemahoning,	231	Northumberland 103 Dauphin 48, Havre 80	Do
Karthaus mines, : : :	253	By Susquehanna 22, and canals 231	Do
Clearfield, : : :	291	By do 60 do 231	Do
Philipsburg *old mines*,	221	Railroad $33\frac{1}{2}$, Penna. canals $142\frac{1}{2}$, Tide 45	Do
Do. Coal Hill, : : :	$214\frac{1}{2}$	Do 27 do $142\frac{1}{2}$ do 45	Do
Above Bleir's Gap,	235	Do 17 do 173 do 45	Do
Blossburg, Tioga, : : :	211	Do 40, Canals 171	Do
Broad Top mountain,	201	Do 25, Penna. canals 131, Tide canal 45	Do
Do. : : : :	216	Slackwater navigation and canals.	Do
TO TIDE WATER		AT PHILADELPHIA.	
Port Lynn or Dauphin	135	By Stony Creek, Schuylkill Haven, and Reading railroad	South region.
Do. : :	133	Do Port Clinton, do	Bituminous.
Do.	116	Harrisburg and Lancaster railroad	Do
Do. : :	$159\frac{3}{4}$	By Tide canal 80, Delaware $79\frac{3}{4}$, lockage 327 feet	Do
Do.	159	By Pa. 17, Union 80, and Schuylkill canal 62, lockage 738 ft.	Do
Six mile openings, : : :	122	Harrisburg 14, Lancaster railroad 108	Do
Do.	123	Railroad 6, Columbia canal 35, Railroad 82	Do
Do. : : :	166	Do 6, Havre 80, Delaware city 38, Philadelphia 42	Do
Do.	165	Do 6, Union 80, Penna. 17, Schuylkill canal 62	Do
Do. : : :	144	Do 6, Havre 80, Wilmington railroad 58	Do
Big Flats,	125	Do 9, Lancaster railroad 116	Do
Rattling Run Gap, : : :	129	Do 13 do 116	Do
Do.	173	Do 13, Havre 80, Delawdre 80	Do
Do. : : :	172	Do 13, Union canal 80, Penna canal 17, Schuylkill 62	Do
Yellow Springs,	$132\frac{1}{2}$	Do $16\frac{1}{2}$, Harrisburg 8, Lancaster railroad 108	Bituminous.
Do. : : : :	$142\frac{1}{2}$	Do Port Mifflin 14, Union and Schuylkill canals $128\frac{1}{2}$	Do
Do.	$175\frac{1}{2}$	Do. Stony Creek $16\frac{1}{2}$, Penna. canal 17, do 142	Do
Rausch Gap, : : :	137	Do 21, Harrisburg 8, Lancaster railroad 108	Transition.
Do.	$138\frac{1}{2}$	Do. Port Mifflin 10, Union and Schuylkill canals $128\frac{1}{2}$	Do
Do. : : : :	$126\frac{1}{2}$	Do. Trout Run at Big Dam $3\frac{1}{2}$ do 123	Do
Do.	126	Indian Creek Gap 10, Union and Schuylkill canals 116	Do
Do. : : :	112	Schuylkill Haven and Reading railroad	Do
Do.	110	Port Clinton and do	Do
Do. : : : :	107	Trout Run 3, Railroad to Philadelphia 104	Do
Do.	180	Stony Creek 21, Middletown 17, Union and Sch'l canals 142	Do
Gold Mine Gap, : : :	141	Do 25, Lancaster railroad 116	Anthracite.
Do.	131	Trout Run 8, Canals 123	Do
Do. : : : :	$134\frac{1}{2}$	Port Mifflin 6, Union and Schuylkill canals, $128\frac{1}{2}$	Do
Black Spring Gap,	108	Pinegrove 8, Schuylkill Haven 14, Reading railroad 86	Do
Do. : : :	122	Do 8 do 14, Canal 100	Do
Do.	104	Do 8, by Port Clinton 23, and Reading railroad 73	Do
Do. : : : :	118	Do 8 do 23, Canal 87	Do
Do.	107	Port Mifflin $4\frac{1}{2}$, Railroad $48\frac{1}{2}$, Reading railroad 54	Do
Do. : : :	133	Do $4\frac{1}{2}$, Union and Schuylkill canals $128\frac{1}{2}$	Do
Do.	185	Stony Creek 26, Middletown 17, Canals 142	Do
Mount Eagle, next county line, :	134	By Union and Schuylkill canals	Do
Swatara District. Lorberry Creek Big Vein,	139	Railroad 5, Union 72, lock. 399 ft.; Sch. canal 62, lock. 182 ft	Do
Do. : :	136	Fishing Creek railroad $7\frac{1}{2}$, Union canal $66\frac{1}{2}$, Schuy. canal 62	Do
Do.	108	By Schuylkill Haven and Canal	Do
Do. : :	103	By Port Clinton and Reading Railroad	Do
Do.	109	Swatara Gap and Railroad to Reading and Philadelphia	Do
Good Spring Creek, : : :	144	Railroad 10, Canals to Philadelphia 134	Do
Pottsville 106—Port Carbon 108,	108	By Schuylkill canal, lockage 610 feet	Do
Do. : : : :	94	By Railroad	Do
Tamaqua,	99	By Railroads, *Port Clinton* 20, *Reading railroad* 79	Do
Do. : : : :	108	Little Schuylkill railroad and Schuylkill canal	Do
Girardville,	119	Railroad and Schuylkill navigation	Second region.
Nesquehoning or Room Run, : :	130	Railroad 5, Lehigh navigation 47, Canal 60, Philadelphia 18	South region.
Mauch-Chunk—Summit mines,	134	Do 9, Canals 125, *in 52 ton boats*	Compact anthracite
Beaver Meadow mines, : :	145	Do 26 do 119	Do Second region.
Hazelton,	149	Do 30 do 119	Do
Buck mountain,	144	Do 4, Lehigh Navigation 62, Philadelphia 78	Do
Wilkesbarre mines, : : :	171	Do 20 do 73, Delaware 60, Phila. 18	North region
Do.	275	By Tide water canal and Delaware	Do
Do. by Union canal, :	275	Pa. canals 133, U. & S. canals 142; lock. 260x519n182=961 ft	Do
Plymouth,	265	By Tide Water Canal	Do
Shamokin collieries, : :	223	Railroad 15, Havre 128. Philadelphia by Delaware 80	2nd Anthracite region.
West Mahanoy coal,	206	Do 26, Feeder and Canals to Havre 100, Philada. 80	Do
Lyken,s Valley old mines, : :	155	Do 16. Penna. canal 57, Columbia railroad 82	South region.
Do.	197	Do 16 do Middletown 39, Union and Sch'l nav. 142	Anthracite.
Do. : : :	196	Do 16, Feeder and Canals 116, Delaware to Philad. 80	Do
Broad Top mountain,	280	Do 25, Penna. canals 113, Union canal 80 Schuyl. 62	Br. Top reg bitum.
Do, : : : :	295	Slackwater 40, Penn., Union and Schuylkill canals 255.	Do
Alleghany Mountain—Loyal sock	198	By Pottsville railroad and Schuylkill canal	Alleghany region.
Do. :	190	By Cattawissa and Reading railroads	Bituminous.
Do.	208	Railroad 15, Pa, canal 85, Harrisburg & Lanc. railroad 108	Do
Do. : :	182	By Pottsville and Reading railroads	Do
Do	251	Railroad 15, Penna. canal 94, Union and Schuyl canals 142	Do
Towanda coal mines, : : :	261	Do 15, Wilkesbarre 75, Lehigh route 171	Do
Lycoming Creek.	241	Do 25. Penna. canal 108, Lancaster railroad 108	Do
Do. : : : :	213	By canal and Cattawissa and Reading railroads	Do
Do.	205	By Pottsville and Reading railroads	Do
Do : : : : :	222	By Pottsville and Sunbury railroad and Schuyl. navigation	Do
Do.	275	Railroad 25, Penna. canal 108, Union and Schuyl canals 142	Do
Farrandsville, : : : :	212	Do 1 do 133, Lancaster Railroad 108	Do
Do.	233	Do Penna canal and Pottsville railroad and Schuyl nav.	Do
Do, : : : :	284	Railroad 1, Penna canal 141, Union and Schuyl. canals 142	Do
14 miles above Dunnstown,	289	Do 2, to Middletown 145 do 142	Do
Do. : : : :	217	Do 2, Penna. canal to Columbia 163, Railroad 82	Do
Sinnemahoning mouth,	315	Pennsylvania canals to Columbia 163, Railroad 82	Bituminous.
Do : : :	258	By Erie and Lancaster railroads	Do
Do.	271	To Columbia by Penna. canal and railroad to Philadelphia.	Do
Do. : : : :	210	By Sunbury 103, Pottsville and Reading railroads 137	Do
Karthaus,	322	By Penna. canal and Union and Schuylkill canals	Do
Clearfield, : : : :	360	do do	Do
Philipsburg—centre mines,	250	Railroad 27, Penna. canal 115, Lancaster railroad 108	Do
Do. : : :	$293\frac{1}{2}$	Do 27 do $142\frac{1}{2}$, U. canal 80, Schuyl. canal 62	Do
Do.	294	Do 27, Havre 197, Delaware to Philadelphia 80	Do
Blair's Gap, : : : :	314	Do 17, Penna. canal 155, Union and Schuyl. canals 142	Do
Do.	271	Do 17 do 146, Lancaster railroad 108	Do
Do.	[illegible]	By Columbia railroad	Do

Sinnemahoning mouth,	315	Pennsylvania canals to Columbia [illegible], Railroad [illegible]	Do
Do.	258	By Erie and Lancaster railroads	Do
Do.	271	To Columbia by Penna. canal and railroad to Philadelphia.	Do
Do.	240	By Sunbury 103, Pottsville and Reading railroads 137	Do
Karthaus,	322	By Penna. canal and Union and Schuylkill canals	Do
Clearfield,	360	do do	Do
Philipsburg—centre mines,	250	Railroad 27, Penna. canal 115, Lancaster railroad 108	Do
Do.	293½	Do 27 do 142½, U. canal 80, Schuyl. canal 62	Do
Do.	294	Do 27, Havre 197, Delaware to Philadelphia 80	Do
Blair's Gap,	314	Do 17, Penna. canal 155, Union and Schuyl. canals 142	Do
Do.	271	Do 17 do 146, Lancaster railroad 108	Do
Do.	273	By Columbia railroad	Anthracite.
Bear Valley coal district,	206	Railroad 26, Canals 100, Delaware to Philadelphia 80	Do
Do.	214	Do 16, Mahantango 17, Midn. 45, U. & S. canals 142	Do
Do. Klinger's Gap,	201	Do. to Susquehanna 23, Canals 187	Bituminous.
Pittsburg via Dauphin,	439	Penna. canal 297, Union 80, Schuylkill canal 62	Do
Do. do.	306	Do 288, Lancaster railroad 108	Do
Do. via Chambersburg,	396	Pittsh. to Chamb. railroad propd. 240, and Lanc railroad 156	Do
Do. via Clearfield, West Branch R. Rds.	397	Sinnemahoning 157, Sunbury 103, by Pottsville 137	Do
Do. West Branch,	415	New Alexandria, Sinnemahoning 117, Philadelphia 258	Do
Sinnemahoning mouth,	267	Sunbury railroad 103, Pa. canal 56, Lancaster railroad 108	
Montezuma—New York canal,	347	By the Lehigh and Delaware route	
Erie, (via Sunbury and Erie rail-roads,)	420	Lockhaven 220, Sunbury 63, by Pottsville 137	
Do. via Lancaster rail road,	402	Warren 62, Sunbury 178, Harrisburg 54, Lancaster 108	
Do. via Elmira, rail-road route,	458	Elmira 205, Williamsport 73, Danville 42, Pottsville 63, Little Schuylkill 21, Reading railroad 54	
Lake Ontario, via Sunbury,	401	Montezuma, Williamsport, Pottsville, Reading railroad	
Cleeveland, Ohio,	623	By canals, Pittsburgh, Chesapeake and Ohio, &c.	Bituminous.
Richmond, Virginia, Chesterfield coal	433	Railroad or canal 13, Fort Monroe 120, Philadelphia 300	
Port Lyon or Dauphin.		**Miscellaneous.**	
To Pittsburg,	280	Pennsylvania canal 138, Portage 37, Canal 105	
Hollidaysburg,	138	Pennsylvania canal	
New York and Erie rail-road,	161	Williamsport 88, Elmira 73	
Erie Canal at Montezuma,	245	Elmira 161, Seneca Lake 61, Montezuma 23	
Buffalo, Lake Erie,	402	To Montezuma 245, Buffalo 157	
Lake Erie,	366	To Elmira 161, Erie railroad 205	
Albany,	451	Montezuma 245, Erie canal 206	
Lake Ontario,	309	Elmira and Montezuma 245 Oswego canal 64	
To Tide Water		**at Bristol.**	
Wilkesbarre,	152	By the Lehigh navigation route	North region.
Mauch Chunk,	116	Railroad 9, Lehigh navigation 47, Delaware Canal 60	South region..
Room Run,	112	Do 5 do 47 do 60	Do Anthracite
Beaver Meadow,	127	Do 27 do 40 do 60	Middle region.
Northampton and Luzerne Company,	129	Do 30 do 39 do 60	Do Anthracite.
Hazelton mine,	131	Do 32 do 39 do 60	Do
Buck mountain mine,	126	Do 4 do 62 do 60	Do
Towanda coal district,	243	Do 15, Wilkesbarre 75, Bristol 153.	Bituminous.
To Tide Water		**at Baltimore.**	
Port Lyon or Dauphin,	85	Canal 25, York Haven railroad 60	South region.
Do.	115	Canals to Havre 80, Baltimore railroad 35	Do
Do.	134	do 80, Chesapeake 54	Do
Stony Cr'k coal District—Six mile openings.	121	Railroad 6, Canals to Havre 80, Baltimore railroad 35	Bituminous.
Do.	91	Do 6, and York Haven route 85	Do
Rattling Run,	147	Do 13, Hávre 80, Chesapeake 51	Do
Do.	98	Do 13, York Haven route 85	Do
Rauch Gap,	104	Do 16, by Indian Cr. and Union canal 26, Y. Haven 68	Do Transition.
Do.	106	By Stony Creek railroad 21, and York Haven 85	Do
Do.	155	Do 21, State Canal & Chesapeake 134	Do
Do.	173	Do by Union canal route	Do
Black Spring Gap,	160	Do 26, Havre 80, Chesapeake 54	Do Anthracite.
Do.	149	By Railroad 4½, Union canal 46½ Havre 63, Balt. railroad 35	Do
Do,	168	By Union canal 51, State canal 18, Tide 45, Chesapeake 51	Do
Wyoming region—Wilkesbarre,	195	By canals and York Haven Railroad.	North region.
Plymouth,	222	Do by Havre, Baltimore Railroad.	Anthracite.
Do.	241	Do do Chesapeake.	Do
Wilkesbarre,	232	Do do Baltimore Railroad.	Do
Do.	251	Do do Chesapeake.	Do
Do.	279	By the Lehigh and Delaware route, Bristol 152, Baltimore 127.	Do
Alleghany mountain—Farrandsville,	256	Havre 202, Chesapeake 54.	Bituminous.
Cumberland near Frostburg.	218	Railroad 10, Canal 138, Railroad 70.	Do
Do. Westernport,	236	Do 12 do 138 do 70.	Do
Do. George's Creek,	240	Do 12 do 138 do 70.	Do
Philipsburg—Centre mines,	221	Do 27, Canals and York Haven Railroad.	Do
Do.	268½	Do 27, Havre 187½, Chesapeake 54.	Do
Berkley and Martinsburg,	170	By Canal and Baltimore and Ohio Railroad	Anthracite.
Wheeling,	339	National road to Cumberland 131, Canal 138, Railroad 70.	Bituminous.
Pittsburg,	338	Monongahela 56, National Railroad 74, Canal and Railroad 208.	Do
		To Delaware City.	
From Port Lyon or Dauphin,	118	By Canals.	Bituminous.
Do. Six mile openings,	124	Do.	Do
Pottsville,	150	Schuylkill Navigation and the Delaware.	Anthracite.
Mauch Chunk,	176	Railroad 9, Lehigh route 125, Delaware 42.	Do
Lyken's Valley mines,	154	Do 16, Havre 100, Delaware 38.	Do
Farraudseille,	240	Do 1, do 201, do 38.	Bituminous
To Tide Water *Stony Creek Coal District.*		**At Washington or Georgetown.**	
From Port Lyon or Dauphin,	153	Canals to Havre 80, Railroad 73.	South region.
Do.	123	To York Haven 25, Baltimore 60, Washington 38.	Do
Six mile openings.	129	Railroad 6, same route 123.	Bituminuous.
Do.	159	Do 6, Havre 80. Railroads 73.	Do
Rattling Run,	166	Railroad 13, Havre 80, Railroads 73.	Bituminous.
Rausch Gap,	142	By Indian Creek, 10 Union Canal 26, York Haven 106.	Transition.
Do.	191	Do 10, Havre 89, Chesapeake 24, Washington 38.	Do
Do.	144	By Stony Creek 21, and Yorkhaven Railroad 123.	Do
Berkley region,	150	By Ohio Canal, Georgetown 1.	Anthracite.
Cumberland region near Frostburg,	197	By do 187, Railroad 10.	Bituminous.
Do. Westernport,	215	do 187, do 28	Do
Do. George's Creek,	219	do 187, do 32.	Do
Do. 16 miles above Westernport,	231	do 187, do 32.	Do
Farrandsville,	294	Havre 202, Baltimore 54, Washington 38.	Do
Cleveland, Ohio,	523	By Pittsburgh and Chesapeake and Ohio Canal.	Do
Pittsburg, (lockage 3,215 feet,)	342	Steamboat 83, National road 72, Ohio Canal 187,	Do
Richmond, Virginia, Chesterfield,	364	Railroad 13, Sloop navigation 64, Ship navigation 287	Do
To Tide Water		**At New York.**	
Mauch Chunk—Summit mines,	157	Railroad 9, Lehigh Navigation 47, in 52 ton boats; Morris Canal 101, in 25 ton boats.	South coal field.
Do.	182	Railroad 9, by Black's Eddy and Raritan Canal 173.	Do Anthracite.
Do.	215	Do 9, Bristol 107, Raritan 99.	Do
Nesquehoning,	178	Do 5 Lehigh Navigation 47, Delaware and Raritan 126, by Black's Eddy in 200 tons barges.	Anthracite.
Do.	211	Railroad 5, Lehigh Nav. 47, Bristol 60, Dela. and Raritan 99.	Do
Beaver Meadow mines,	193	Do 26, by Black's Eddy.	Do
Do	169	Do 28, and by Morris Canal 141.	Do
Lycoming Creek mines,	323	Do 25, Pa. Can. 88, St. Cr. to Easton 109, Mor. Canal 101.	Bituminous.
Port Lyon or Dauphin,	211	Proposed R. Rd. by Pt. Clint. to Allen. 94, Easton 16, do 101.	Do
Sinnemahoning mouth,	361	Sunbury 103, Port Lyon 48, by Morris Canal 210.	Do
Erie by Dauphin,	541	Railroad to Sinnemahoning 180, to New York as above 361.	
Pittsburg by Sunbury rail road and Dauphin,	518	Do do 157, Dauphin 151, by do 210.	Do
Do. by Penna. canal,	490	Canals to Dauphin 280, to New York as above 210	Do
Do. via New York and Ohio canals,	1008	Canal 670, River 145, Lake 193, (lockage 1,877 feet.)	Do
Cleveland, Ohio,	660	Buffalo 160, Albany 350, New York 150.	Do
Do.	701	Via Pittsburgh and the Chesapeake and Ohio Canal, &c.	Do
Montezuma on the Erie canal,	368	By the Erie Canal.	
Do.	370	By the Lehigh and Morris Canals.	
Montezuma on the Erie canal,	395	By Black's Eddy outlet and Delaware and Raritan Canal.	
Port Lyon or Dauphin	278	Havre 80, Philadelphia 80, New York 118.	
Black Spring Gap,	185	Port Clinton 38, Easton 46, Morris Canal 101.	Anthracite.
Lorberry Creek,	177	Do 30, 46, 101.	Do
Pottsville,	166	Hamburg 19, 46, 101.	Do
Do.	236	By Philadelphia, &c.	Do
Nesquehoning or Room Run,	153	Railroad 5, Lehigh 47, Morris Canal 101.	Do
Carbondale,	217	Do 17, with 1,767 ft. rise and fall; Dela. and Hudson Canal 108, with 1,076 ft. lockage in 30 ton boats, and the Hudson.	North region
Wilkesbarre,	218	By Black's Eddy.	Anthracite.
Do.	194	By Susquehanna and Lehigh Railroad 20, 73, 101.	Do
Do.	385	By Havre de Grace.	Do
Do.	391	By Penna. Union and Schuylkill Canals.	Do
Whiteshaven,	232	Lehigh Nav. 73, Dela. Canal 60, Delaware 10, Raritan 89.	Do
Towanda coal region,	342	Railroad 15, Penna. Canal to Wilkesbarre 75, Railroad 20, Lehigh Navigation 73, Dela. Canal 60, Dela. 10, Raritan 89.	Bituminous
Do. by Morris canal,	284	To Easton 183, Morris Canal 101.	Do

The bituminous coals of the United States are also considerably heavier than those of Europe. With but one or two exceptions, all Coals of the United States exceed one ton in weight to the cubic yard; while there is no instance of the bituminous Coal of Europe reaching that weight.

Prof. Johnson, who conducted, by authority of Congress, a series of experiments on American Coals, applicable to steam navigation, and to other purposes, in his report to that body, in 1844, says that the justly celebrated foreign bituminous Coals of Newcastle, Liverpool, Scotland, Pictou, and Sidney—Coals which constitute the present reliance of the great lines of Atlantic steamers—are fully equalled, or rather surpassed in strength, by the analogous Coals of eastern Virginia; that they are decidedly surpassed by all the free-burning coals of Maryland and Pennsylvania; and that an equally decided advantage in steam-generating power enjoyed by the anthracites over the foreign coals tried, whether we consider them under equal weights or equal bulks.

He also adds, that experiment appears to demonstrate that, for the purpose of *rapid* evaporation, for the production of illuminating gas, the coal of Indiana, though neither very heavy nor very durable, is inferior to none of the highly bituminous class to which it belongs; since in heating power, and in freedom from impurity, it surpasses the splint and cannel coal of Scotland.

From this report we select the following table, which is copied by Mr. Taylor with the following remarks:

"Our space precludes our quoting extensively from this voluminous document, [Prof. Johnson's Report]; but we cannot refrain from selecting the following table, of the relative degree of comparative power of different coals under similar or uniform *bulks*. We select this table, at the suggestion of the author, in preference to that which exhibits "the order of evaporative power under equal *weights*."

Classification of American Coals in the order of Evaporative power under equal *bulks*, to which is added the relative numerical rank of the same Coals under equal *weights*, also in the order of their specific gravities, and of their marketable weight.

No.	Names and localities.	State or County.	Quality.	Pounds of steam from 212°, produced by one cubic foot of each coal.	Relative evaporative power for equal bulks of Coal.	The same Coals. Evaporative power under equal weights.	In the order of their specific gravities.	In the order of their weight in the marketable state.
1	Atkinson's Cumberl'd coal,	Maryland,	Dry Bituminous coal,	566 2	1000	1	29	21
2	Beaver Meadow, Slope V.,	Pennsylvania,	Anthracite white ash,	556.1	982	7	3	1
3	Peach Mountain,	Schuylkill Co. Pa.,	" red ash,	545.7	964	3	6	11
4	Forest Improvement,	"	" white ash,	540.8	955	4	5	13
5	Easby's Cumberland coal,	Maryland,	Dry Bituminous coal,	535.6	946	6	21	23
6	N. Y. & Maryland Comp.,	Cumberland coal,	" free burning,	524.8	927	9	9	12
7	Queen's Run coal,	Clinton Co., Pa.	Moderately bituminous,	517.0	913	2	22	28
8	Blossburg.	Tioga Co., Pa	"	515.9	911	10	25	20
9	Neff's Cumberland coal,	Maryland,	Free burning bituminous,	512.7	906	12	20	9
10	Easby's "coal in store,"	Cumberland, Md.	"	511.1	903	5	30	16
11	Beaver Meadow, No. 3,	Pennsylvania,	Anthracite white ash,	505.5	893	15	1	5
12	" navy yard,	"	"	500.0	883	18		4
13	Mixture 1-5 Cumberl'd, and 4-5 Beaver Meadow,		Mixed,	498.5	880	16		6
14	Lehigh Coal,	Pennsylvania,	Anthracite white ash,	494 0	872	23	2	3
15	Ralston,	Lycoming creek, Pa.	Moderately bituminous,	493.3	871	24	16	2
16	Summit Portage coal,	Cambria Co., Pa.	Bituminous,	486.9	860	14	12	17
17	Mixture 1 5 Mid-Lothian, and 4-5 Beaver Meadow,		Mixed,	481.1	850	25		8
18	Barr's deep run,	near Richmond, Va.	Bituminous,	478.7	845	19	17	19
19	Lackawanna,	Pennsylvania,	Anthracite white ash,	477.7	844	8	10	30
20	Karthaus,	"	Moderately bituminous,	477.4	843	17	34	22
21	Stony Creek. Perseverance seam,	Dauphin Co., Pa.	Semi-bituminous,	472.8	835	13	8	26
22	Lykens Valley,	"	Anthracite,	459.7	812	11	15	31
23	Pictou,	Nova Scotia,	Bituminous,	450.6	796	33	28	15
24	Mid-Lothian, average,	Richmond, Va.	"	448.5	792	35	31	10
25	Crouche's Pits,	"	"	445.0	785	34	7	14
26	Newcastle,	England,	Fat Bituminous coal,	439.6	776	27	38	25
27	Mid-lothian, 900 feet shaft,	Virginia,	Bituminous,	433.7	766	29	13	27
28	" new shaft,	"	"	418.6	739	26	24	32
29	Pictou, Cunards,	Nova Scotia,	"	417.9	738	30	23	29
30	Chesterfield company,	Richmond, Va.,	"	410.9	726	20	32	40
31	Mid-Lothian screened,	"	"	408.7	722	22	35	39
32	Natural Coke,	"	"	395.3	698	31	26	37
33	Creek company,	Chesterfield Co., Va.	"	391.8	692	32	27	38
34	Pittsburg,	Pennsylvania,	Fat Bituminous coal,	384.1	678	36	39	36
35	Sydney Coal,	Cape Breton,	Bituminous,	376.9	669	37	19	35
36	Liverpool,	England,	Fat Bituminous coal,	375.4	663	38	37	33
37	Scotch,	Scotland,	Bituminous,	353.8	625	42	4	24
38	Tippecanoe,	near Petersburg, Va.	"	350 2	618	39	18	42
39	Cannelton,	Indiana.	Cannel coal,	348.8	616	41	36	34
40	Clover Hill,	Richmond, Va.	Bituminous,	347.4	614	40	33	41
41	Coke of Cumberland coal,	Maryland,	Coke,	284.0	502	21		44
42	Coke of Richmond coal,	Virginia,	"	282.6	499	28		43
43	Dry Pine Wood,		Pine wood,	98.6	173	43	40	45

Mr. Johnson remarks, that Coal, "when sold by weight, and used on shore, the weight per cubic foot is a point of little moment—Space for storage is easily obtained. But in steam navigation, bulk, as well as weight, demand attention; and a difference of twenty per cent., which experiment shows to exist between the highest and lowest average weight of a cubic foot of different coals, assumes a value of no little magnitude. This is obviously true, since, if other things be equal, the length of a voyage must depend on the amount of evaporative power afforded by the fuel which can be stowed in the bunkers of a steamer, always of limited capacity

---

General Features of Pennsylvania Anthracite.

The anthracites have specific gravities, varying from 1.39 to 1.61; retain their form when exposed to a heat of ignition, and undergo no proper intumescence while parting with the small portion of volatile matter which they contain: or, if changed at all, are only disintegrated into angular fragments. Their flame is generally short, of a blue color, and consequently of little illuminating power. They are ignited with difficulty; give an intense concentrated heat; but generally become extinct while yet a considerable quantity remains unburnt in the grate.

In experimenting with American coals, Prof Johnson thus describes the differences between the red and white-ash coals of our region.

First, of the Red-Ash, Peach Mountain.—The sample exhibited a deep jet-black color; an uneven splintery fracture; a lustre varying from dull to shining, according to the direction in which the fracture is made. Like all the other anthracites, it was wholly unaffected by atmospheric influences in a period of eighteen months, during which time they were in my charge.

This sample is more easily seperated at the surfaces of deposition than most of the white-ash coals, but less so than that of Lyken's valley. It has no exterior indications of impurity, such as discoloration from oxide of iron, or efflorescence of metallic salts. It has certain surfaces polished and minutely striated, appearing as if they had been subjected to friction under intense pressure. This feature is not, however, of so frequent occurrence in this, as in many other samples of anthracite.

Its specific gravity, determined by two specimens, was found to be 1.465 and 1.4632—the mean of which enables us to calculate the weight of a cubic foot of solid coal at 91.505 pounds. But the weighing of 70 charges of 2 cubic feet each, in the state of lumps, gave 53.7939 pounds per cubic foot, proving that the actual weight in the market is but 0.5878 of the calculated weight in the mine. The same data prove that 42.64 cubic feet of space will be required for one gross ton.

Analysis.	Carbon,	36.087
	Volatile matter,	6,965
	Earthy matter,	6,948

Second, of the White-Ash, Summit Hill.—The aspect and character of this coal leave no doubt that it will remain for any desired length of time, either under shelter or in the open air, without material change.

The coal was received generally in lumps, requiring to be reduced in order to be burned advantageously on the grate. Its aspect is that of most of the harder anthracites, possessing a deep black color, shining uneven

Composition and character of Ashes, from various kinds of Coal.

Character and ingredients of ashes.	Sugarloaf Company's Anthracite, Hazle Creek—1st specimen. Specific gravity 1 591.	Sugarloaf Anthracite,—2d specimen. Specific gravity 1.574	Sugarloaf Anthracite,—3d specimen. Specific gravity 1.55.	Buck Mountain Anthracite. Specific gravity 1.559.	Summit Coal Comp.'s Anthracite, head of Beaver Creek,—1st sp. Specific gravity 1.613.	Summit Company's Anthracite, —2d specimen. Specific gravity 1.594	Stevenson's Bluff Anthracite, Beaver creek. Specific gravity 1.612.	Salem-vein Anthracite, Pottsville. Specific gravity 1.569.	Quin's Run butuminous Coal. Specific gravity 1.372.
Per centage of ashes in the coal,	4.83	8.73	2.242	3.079	5.01	4.00	3.71	6.75	6.80
Color,	light buff.	reddish white	white.	reddish. buff,	fawn.	reddish gray.	fawn.	brick red.	gray.
Silica in ashes, pr. ct.	53.603	45.105	43.68	45 60	54.50	50.25	50.05	50.00	76.00
Alumina,	36.687	37 000	39.34	42,75	34.45	38.90	39.04	38.90	21.00
Peroxide of iron,	5.590	13.000	3.22	9.43	7.50	8.75	8.75	8.00	2.60
Lime,	2.357	1.380	5.76	1.41	2.25	0.85	1.56	2.10	-
Magnesia,	1.076	2.430	3.00	0.33	1.30	1.25	1.30	0.90	
Oxide of manganese,	0 186								
Loss, per cent.		1.085							0.40
Sum	99.989	100.	100.	99.52	100.	100.	100.70	99.90	100.

and splintery fracture, with occasional exposure of couchoidal forms; a striated rather grayish appearance, generally indicative of considerable portions of earthy impurity, marks certain surfaces. The seams of deposition are seldom followed by the fractures.

The specific gravity of two specimens was found to be 1,6126 and 1,5679, from which the calculated weights per cubic foot are 100.79 and 97.99 pounds, respectively, or, on an average, 99.39 pounds.

Analysis.		
	Carbon,	88.052
	Volatile matter,	5.285
	Earthy matter,	6.663

The foregoing tables will, doubtless, give a satisfactory exhibit as to the relative value of the different coals named for steam navigation, iron making, or for generating steam ordinarily. For stove use, the following experiment will determine the respective value of the white and red-ash varieties. Two rooms of nearly the same size, and having the same temperature, were selected to ascertain how many pounds of each kind would be required to heat them to a temperature of 65 degrees, during a period of fifteen hours, when the temperature out of doors, at 9 A. M., was at ten degrees below the freezing point. Two days were occupied in the trial, so that the red and white-ash coals might be used in *alternate* rooms. Fires were made at 9 A. M. and continued until 12 P. M. Two thermometers (one in each room) were suspended at the greatest distance from the grates, and the temperature was carefully registered every hour. The result was as follows: Thirty-one pounds, each day, of the Schuylkill *red-ash* coal, gave a mean temperature of 64 degrees; and thirty-seven pounds, each day, of the Lehigh, *white-ash*, taken from a vein of high repute, gave a mean temperature of 63 degrees—thus making 2000 pounds of the red-ash to be equal to 2,337 pounds of the white-ash, or red-ash coal at $5 50 per ton, to be equal to white ash at $4 61. This, says Mr. Taylor, settles the question between the two coals on the score of economy.

MISCELLANEOUS STATISTICS.

Accompanying this work will be found an interesting table, exhibiting the different routes to market, with the respective distances of the mining districts from the principal markets. (See page 57.) We have altered its shape only, as taken from the Report of the President of the Dauphin Coal Company to the Board of Managers, 1842.

The following table will show the railways and Canals in direct communication with the Coal regions of Pennsylvania, and which were constructed almost entirely for the purpose of the Coal trade. Of the railroads under ground no exact statement can be afforded. We have, however, made an estimate of the probable length and cost, which will doubtless suffice:

Canal and Railroad System in relation to the Anthracite Districts of Pennsylvania.

Names of RAILROADS AND CANALS.	Canals.		Railroads.		Total Cost.
	No.	Miles	No.	Miles	Dollars.
Lehigh Navigation,	1	87½			$4,455,000
Lehigh and Susquehanna Railroad,			1	20	1,350,000
Mauch Chunk and Summit Railroads, &c.,			1	36	331,684
Delaware Division of the Penn. Canal	1	43			1,734,958
Beaver Meadow Railroad,			1	26	360.000
Hazleton Railroad,			1	10	120,000
Buck Mountain Railroad,			1	4	40,000
Summit railroad,			1	2	20.000
Delaware and Hudson Canal—partly in N. Jersey	1	108	1	16	3,250,000
Morris Coal Canal, in New Jersey,	1	102			4,000,000
The Schuylkill Navigation,	1	108			5,785,000
The Reading and Pottsville Railroad,			1	98	11,590,000
Little Schuylkill and Tamaqua Railroad,			1	20	500,000
Mine Hill and Schuylkill Haven and Extension, to Swatara,			1	55	550,000
Danville and Pottsville, 44¼ m. unfinished,			1	29½	680,000
Mount Carbon Railroad,			1	7	155,000
Do and Port Carbon Railroad,			1	2½	120,000
Schuylkill Valley Railroad,			1	14	300,000
Mill Creek Railroad,			1	6	120,000
Railroads by individuals,				70	180,000
Under-ground Railroads,				100	120,000
Lyken's Valley Railroad,			1	16	200,000
Wisconisco Canal,	1	12			370,000
Swatara Railroad,			1	4	20,000
North Branch Canal—division,	1	73			1,491,894
Do extension,	1	90			1,298,416
Wyoming Improvements, not ascertained,					
	8	623½	17	436	

There are many private railroads constructed since the above was drawn up. The whole may be estimated at more than forty millions of dollars.

The table entitled "Official Report of the Anthracite Coal Trade of Pennsylvania," and which is attached to the table of "Distances" accompanying this work, will exhibit the annual product of each mining district from the commencement. Annexed is a table showing the *Importation of Foreign Coal into the United States*;

Years.	Tons.	Official Value Dollars.	Duties Received. Dollars.	Tariff.
1789	3,850	—	—	2 cts. a bushel.
1795	4,477	—	8,338	
1800	11,787	—	25,150	
1805	17,805	—	25,810	5 cts. do.
1810	14,030	—	19,907	
1814	691	War.	War.	10 cts. do.
1815	3,514	Peace.	Peace.	
1820	24,061	—	53,685	5 cts. do.
1825	25,795	108,527		
1830	58,582	204,773	98,417	
1835	59,972	143,461		
1837	153,450	—		6 cts. do.
1839	181,551	—		
1840	162,867	387,238	273,610	
1842	141,526	—		
1843	41,163	116,312		
1844	87,073	236,963		
1845	85,771	224,483	151,021	$1 75 pr. ton.
1846	156,853	378,597	274,492	
1847	148,021	370,985	123,662	30 pr. c. ad vl.

Average Prices of Labor.

WAGES PER DAY.

Years.	Miners.	Laborers.	Remarks.
1831	$1 00	80 cents,	
1840	87½	70 "	Wages paid in *orders*.
1841	87½	70 "	
1842	87½	70 "	
1843	1 10	80 "	Labor in demand, and wages paid in money.
1844	1 15½	85 "	
1845	1 20	87 "	
1846	1 25	87 "	
1847	1 25	88 " *	
1848	1 00	70 "	Labor not in demand, wages paid in *orders*.

* Wages same price as last year, owing to high price of provisions. The price of coal averaged 25 cents per ton less, and the collieries generally lost money on their business.

Average Prices of Anthracite in New-York, Boston and Philadelphia.

Years.	Philadelphia. Wholesale, per ton of 2240 lbs.	New York. Retail, per ton of 2000 lbs.	Boston. Retail per ton of 2000 lbs.
1839	$5 50	$8 00	$9 00 to 10 00
1840	5 50	8 00	9 00 to 11 00
1841	5 00	7 75	8 00 to 9 00
1842	4 25	6 50	6 00 to 6 50
1843	3 50	5 75	6 00 to 6 50
1844	3 37	5 50	6 00 to 6 50
1845	3 50	5 75	6 00 to 7 00
1846	4 00	6 00	6 50 to 7 00
1847	3 85 to 4 00	5 50 to 6 00	6 50 to 7 00

COAL TRADE FOR 1847—8.

The following is the official quantity of Coal sent to market in the following years, which we have procured at considerable trouble and can be relied on as correct.

Schuylkill.	1847.	1846.	Increase.
Railroad,	1,360,681	1,233,562	127,119
Canal,	222,693	3,440	219,253
Pinegrove,	67,457	58,926	8,531
	1,650,831	1,295,928	354,903
Lehigh,	643,973	522,989	120,984
Lackawanna,	388,203	320,000	68,203
Wilkesbarre,	284,398	192,503	91,895
Shamokin,	14,904	12,572	2,332
	2,982,309	2,343,992	
	2,343,992		

Increase in '47, 638,317 tons.

Of the quantity sent to market, Schuylkill County furnished,	tons,	1,650,831
All other regions,	"	1,331,275
Excess in favor of Schuylkill Co.		319,536

It will be observed that the increase for Schuylkill county in 1847, 354,903 tons, and the increase from all the other regions was only 283,211.

Of the whole quantity sent to market since the commencement of the trade, Schuylkill Co., has furnished	tons,	10,213,120
All other regions,	"	8,580,480
		18,793,603

Coal Trade of the Line.

The following is the quantity of Coal delivered on the line of Railroad in 1846 and 1847.

	1847.	1846.
Orwigsburg,	167	75
Port Clinton,	0	6
Hamburg,	1007	971
Mohrsville,	1060	1300
Between Mohrsville and Reading,	1324	1042
Reading,	47,574	35,738
Baumstown,	1446	1854
Douglassville,	1733	1433
Pottstown,	6109	3696
Royer's Ford,	285	317
Phœnixville,	45,878	23,853
Valley Forge,	1990	1480
Port Kennedy,	6774	4079
Norristown,	9061	11,988
Lime Kilns below Norristown	2054	1362
Conshohocken Spring Mill and Plymouth,	41,458	26,170
Manayunk,	5345	6930
Falls,	7059	2996
Germantown,	3875	5362
Nicetown,	5098	5720
Trenton Railroad,	0000	2907
Junction with Sate Road,	10,343	6181
	201,140	155,460
To Philadelphia,	203,540	198,582
To Richmond,	956,001	844,216
	1,360,681	1,188,258

The quantity of coal delivered on the line of canal during the year 1847, was 25,470 tons—making the whole supply for the year 1847, 226,610 tons, an increase over 1846 of 71,150 tons.

Lehigh Coal Trade.

The following is a comparison of the trade in the following years, sent from the different sections of this region:

	1847.	1846.
Lehigh Summit Mines,	201,961	165,011
Do. Room Run,	132,978	109,652
Beaver Meadow Co.	109,363	85,948
Summit Co.	32,820	11,863
Hazleton Co.	105,766	98,541
Buck Mountain Co.	50,847	46,104
Wyoming,	10,246	5,866
	643,912	522,989
	522,989	
Increase in 1847,	120,983	

The Swatara Coal Region.

This region is beginning to attract attention, from the fact that it has secured to it two outlets to market, which will greatly increase its trade hereafter, and render a large extent of coal land productive. During the last season the extension of the West Branch Rail Road, a distance of 7½ miles, was completed, which connects Tremont, Donaldson, &c., with the Schuylkill Valley at Schuylkill Haven, and about 2000 tons were sent to market. The increase this year will be considerable.

Little Schuylkill Coal Trade.

The trade from this region is on the increase, and will no doubt continue to increase very rapidly hereafter. The facilities have been greatly increased by the laying down of a substantial iron road leading from Tamaqua to Port Clinton, a distance of 20 miles, and the introduction of motive power during part of the past season. There are ten collieries in operation, and one preparing. Eleven engines in all, of 200 horse power, are at work in the region, ten of which drive breakers—and one is used for hoisting coal. There was sent from this section of the region, in 1847, 106,401 tons of coals, by the following operators:

J. & R. Carter.	tons,	31,344
Heaton & Carter,	"	24,282
Harlan & Henderson,	"	16,901
Robert Ratcliff & Co.,	"	13,512
James Taggart,	"	9,488
Wm. Donaldson,	"	9,265
Hendricks, Jones & Birbeck, (new colliery.)	"	802
John Anderson & Co.	"	807
		106,406

The following shows the trade of this region from its commencement in 1832, in round numbers:

	Tons.
In 1832	14,000
1833	40,000
1834	34 000
1835	41,000
1836	35,000
1837	31.000
1738	13 000
1839	9,000
1840	20,000
1841	40,000
1842	27,000
1843	31.000
1844	57 000
1845	74 000
1846	91.000
1847	196,401
Total in 16 years,	654,258

The town of Tamaqua has increased very rapidly in population during the last year—we suppose it has nearly trebled within the last four years. Whole streets have sprung up as if by magic, and some of the edifices are among the largest, most substantial and beautiful in the county.

The Foreign Coal Trade.

The following is the quantity of coal imported in the United States, from June 30th, 1821, to June 30th, 1847, both years inclusive, in tons of 28 bushels, obtained from the official documents at Washington, together with the quantity of Anthracite sent to market annually during the same period.

Years.	Foreign Coal.	Anthracite Coal.
1820		365
1821	22,122	1,073
1822	34,523	2,240
1823	30,433	5,823
1824	7,228	9,541
1825	25,645	34,983
1826	35,665	48.047
1827	40,257	63,434
1828	32,302	77,516
1829	45,393	112,083
1830	58,136	174,734
1831	36,509	176,820
1832	72,978	363,871
1833	92,432	487,748
1834	71,626	376 636
1835	49,969	560,758
1836	108,432	682,428
1837	153,450	881,476
1838	129,083	739,293
1839	181,551	819,327
1840	162,867	865,414
1841	155,394	958,899
1842	141,521	1,108,001
1843	41,163	1,263,539
1844	87,073	1,631,669
1845	85,776	2,023,052
1846	156,853	2,343,992
1847	148,021	2,982,309

The importation of Foreign coal, under a duty of $1 75 per ton, our readers will observe, has increased considerably within the

last two years, ending June 30th, 1847. This was caused in a great measure by the heavy trade between this country and Europe, in the shape of bread stuffs—coal having been substituted on their route home as ballast.

The Coal Trade of 1848.

The Coal Trade has, throughout the whole of the season now drawing to a close, been exceedingly *dull.* The prices, early in the season, experienced a ruinous fall, and they have not yet recovered; nor is there a reasonable prospect of an immediate recovery.—There has been no material increase of consumption over last year, for manufacturing purposes; the principal increase has been for steamboats, and similar purposes—while for domestic purposes the increase has maintained its usual per centum with the increase of population, &c. The whole increase, therefore, is less than *one-half* what it was at the same period last year, and the prospects of the miner, the laborer, and the Coal operator are alike gloomy and alarming.

Schuylkill.—The following is the amount of Coal transported over the several railroads of Schuylkill county, up to the 5th of August, 1848.

Mine Hill and S. H. Railroad		369,425 01
Mount Carbon	do	139,033 02
Schuylkill Valley	do	180,730 06
Mill Creek	do	121,539 10
Mt. Carbon & Pt. Carbon	do	226,128 19
Little Schuylkill Railroad		91,254 03
Union Canal Railroad		32,091 13 2
Swatara Railroad		15,581 06

The following is the amount of Coal sent from the points named, up to the 3d of August, 848.

	RAILROAD.	CANAL.
Port Carbon	224,175 15	139,994 01
Pottsville	119,280 17	15,408 19
S. Haven	305,139 11	58,584 10
Port Clinton,	87,031 06	3,185 16
	725,627 09	217,172 06

[For rates of toll, and other particulars of inland transportation from the Coal Regions, see advertisements near the end of this book.]

Lehigh.—The following is the amount of Coal forwarded from the mines in the Lehigh District, up to July 29, 1848.

Summit	114,606 09
Rhume Run	59.659 03
Beaver Meadows	40,077 19
Spring Mountain	32,781 11
Hazleton	53,527 15
Buck Mountain	37.459 08
Wyoming	3,113 09
	341,225 09

To the same period last year, 325,561 01 tons.

Delaware and Hudson.—The amount of Coal shipped this year to July 22, is 194,949 00—to same period last year, 162,596 00.

Coal Breakers.

On the West Branch there are 26 Breakers in use, 19 of which are of Battin's Patent, 3 of Kauffman's, 2 of Richardson's, and 2 of Dehaven's.

On the Norwegian there are 13 Breakers, 12 of Battins' and 1 of Dehaven.

On the Mill Creek there are 13 Breakers—10 of Battin's and three Coffee Mills.

On the Schuylkill Valley there are 19 Breakers—15 of Battin's, 1 of Richardson's, 1 of Dehaven's, and two Coffee mills.

On the Little Schuylkill there are 7 Breakers, we believe all of the Lehigh pattern.

On the Swatara there are 5 Breakers—1 of Battin's, the others are Umholtz' pattern.

Recapitulation.

Battin's	57
Richardson's	3
Dehaven's	5
Coffee Mill Breakers,	5
Kauffman's	3
On the Little Schuylkill, Lehigh Pattern,	7
On the Swatara, Umholtz's Pattern,	4
Total number of breakers in use,	84

All Battin's Breakers are driven by steam, except three—one of which is driven by water-power, and the others by horse-power. One of Richardson's is driven by horse-power; also three of the Coffee Mills. The other Coffee Mills are driven by water-power. The number of breakers driven by steam-power, is 73. All these breakers, with the exception of one or two, have been introduced within three years.

Progress of Steam Power in the Coal Business.

The whole number of Steam Engines engaged in the Coal Trade in this region is as follows:

		Engines.	Horse Power.
Engaged in the trade in	1845,	68	2018
Added in	1846,	38	903
		106	2921
Added in	1847.	61	1544
		167	4465

Making the whole number of Engines engaged in pumping, hoisting, and breaking Coal in the Schuylkill County Coal Region, 167—with an aggregate power of 4465 horses. As a portion of these engines are run day and night, a horse power may be estimated equal to the power of ten men, consequently they perform the labor of *forty-four thousand six hundred and fifty men.*

All the Engines added in 1847 were built in Schuylkill County. Our machinists also built, during the year, 18 engines for other purposes than mining, with an aggregate power of 668 horses. Eight of these are used in Schuylkill county for various purposes—the others were sent to Boston, Reading, Harrisburg, Columbia and Carbon counties, Sunbury, Mexico, &c. &c. making 79 steam engines of the power of 2212 horses turned out in Schuylkill County in the year 1847. We

question whether any other county or city in the United States turned out an equal number of engines within the same period.

By a recent official report, it appears that in France, which numbers a population of upwards of 34,000,000 inhabitants, there were in 1845, only 207 steam engines in operation in that country—there are in Schuylkill county alone 206 steam engines erected at the present time, all of which are running except three or four.

The engines built and sold during the last year were turned out at the following establishments:

	No.	H. Power.
Haywood & Snyder, Pottsville,	18	658
E. W. McGinnis, "	12	480
J. L. Pott, "	4	75
W. Dehaven, Minersville,	20	540
S Sillyman & Co., Port Carbon,	6	120
T. Wintersteen, "	6	139
Hudson, Smith & Taylor, Tamaqua, -	8	140
Umholtz & Co., Tremont,	4	50
Hawks, Sykes & Vancleve, St. Clair, . .	1	15
	79	2212

MISCELLANEOUS STATISTICS OF SCHUYLKILL COUNTY.

Schuylkill county was erected from Berks and Northampton counties, by an act of the Legislature of the 1st of March, 1811. Length 30 miles, breadth 20, and area 750 miles.

Population in	1820,	11,339
"	1830,	20,744
"	1840,	29,053
"	1845,	31,992
"	1848,	33,551

Its MOUNTAINS are, on the South, the Kittatinny; then, Second, Sharp and Broad mountains occur; the Mahantango and the Line mountains are in the North-West part of the county; and on the North-East are the Locust, Mahanoy and Green mountains. Several others of less size fill up the spaces between the principal ridges above named.

The STREAMS are the Schuylkill River, flowing to the Delaware, with its various branches, of which Little Schuylkill is the principal, and Norwegian and Mill Creek the least; the Swatara in the South-West, the Mahantango in the North-West, and the Mahanoy in the North, all emptying into the Susquehanna. In the North-East, the Catawissa empties into the North Branch, and in the South-east are some of the tributaries of the Lehigh.

Schuylkill county contains 18 townships, 6 boroughs, and a number of busy, flourishing villages.

Primary and Common Schools in 1840,	31
Academies and Grammar Schools, "	3
Persons engaged in Mining, "	1,108
" Agriculture, "	3,216
" Commerce, "	78
" Manuf's & trades, "	972
Primary and Common Schools, in 1848,	40
Academies and Grammar Schools, "	5
Persons engaged in mining, over "	7,000
" agriculture, "	3,302
" commerce, over, "	250
" manuf's & trades, "	1,50

Newspapers published in the county.

In Pottsville,	3 English,	2 German.
In Schuhlkill Haven,	1 "	
In Orwisburg,		1 "
In Tamaqua,	1 "	
	5	3

COUNTY OFFICERS.

J Thomas Werner,	Sheriff
Christian M. Straub,	Prothonotary
Samuel Guss,	Register and Rec'r
Benjamin Christ,	Treaurer
George H Sticher,	Commissioners.
Lewis Dreher,	Commissioners.
Isaac Betz,	Commissioners.
G. B. Zulich,	Comm'rs Clerk

OFFICERS OF THE COURT.

Hon. Luther Kidder,	President Judge
" Strange N Palmer,	Associate do.
" Charles Frailey,	Associate do.
Christian M Straub,	Clerk
Francis W. Hughes,	Dep. Att'y Gen.

MEMBERS OF THE BAR.

Christopher Loeser,	Orwisburg.
John Bannan,	"
William B. Potts,	"
J. H. Graeff,	"
J. W. Roseberry,	"
Charles Whitman,	"
B. W. Cumming,	Pottsville.
B. Bartholomew,	"
F. W. Hughes,	"
C. W. Hegins,	"
E. Owen Parry,	"
J. H. Campbell,	"
J. C. Neville,	"
D. E. Nice,	"
Horace Smith,	"
J. Henry Adam,	"
R. M. Palmer,	"
Howell Fisher,	"
John P Hobart,	"
Thomas H. Walker,	"
J K Hamlin,	"
R H Hobart,	"
E O Jackson,	"
A W Leyburn,	Schuylkill Haven.
G. W Matchin,	"
T Robinson,	"
Samuel Brownwell,	Tamaqua.
James A Banks	"
J K Clement,	Minersville

ESTIMATED POPULATION OF THE PRINCIPAL TOWNS.

Pottsville	7,500
Tamaqua	3,000
Minersville	3,300
Port Carbon	2,200
Schuylkill Haven	2,000

Orwigsburg,	900
St. Clair,	1,400
New Castle,	300
Llewellyn,	550
Tremont,	800
Donaldson,	700
Pine Grove,	500
Tuscarora,	400
Brockville,	500
Middleport,	400
Hecksherville,	900

AMOUNT OF STATE TAX COLLECTED IN 1847.

Taxes on Merchandize,	$2,658 15
" Tavern Licenses,	1,803, 83
	$4,461 98

RECEIPTS AND EXPENDITURES OF THE COUNTY, FOR THE YEAR ENDING DEC. 31, 1847.

Received, Tax on real and personal property, &c.		$36,696 02
Expenditure for Alms House,	$ 5,500 00	
Balance of expenditures, inclusive,	30,427 18	
		35 927 18

Bal. of receipts over expenditures, $668 84

LIST OF POST OFFICES IN SCHUYLKILL CO. PA.

Post Offices.	*Post Masters.*
Barre,	H. M. Otto
Bearmount,	Jacob Heberling
Blythe,	J. H. Alter
Broad Mountain,	W. Reifsnyder
Catawissa Valley,	J. Eisenhower
Donaldson,	David Lomison
Fountain Spring,	George Seitzinger
Friedensburg,	Augustus Heintz
Hecksherville,	William Paine
Kepner's	Samuel K M Kepner
Llewellyn	John Koch
Lower Mahantango	Daniel Wiest
M'Keansburg	Joshua Boyer
Middleport	Daniel Koch
Minersville	Michael Weaver
Norwegian	Jacob Metz
Orwigsburg	C. A. Rahn
Pine Grove	Paul Barr
Port Carbon	Peter Aurand
Port Clinton	Samuel Boy
Pottsville	Daniel Krebs
Schuylkill Haven	Jacob Rahn
Tamaqua	Benjamin Heilner
Upper Mahantango	Charles Maurer
West Penn	Jacob Schwartz

ELECTION RETURNS of Schuylkill County, at the Gubernatorial election, Oct. 1847.

Shunk, D.	*Irvin, W*
3,720	2,833
2,833	

887 Shunk's majority.

SCHUYLKILL COUNTY MEDICAL SOCIETY

George Halberstadt, M. D. President.
James S. Carpenter, M. D. Vice President
Thomas Brady, M. D. Treasurer
William Housel, M. D. Cor. Secretary
John G. Koehler, M. D. Rec. Secretary

Meet at the Pennsylvania Hall, in Pottsville, on the first Wednesday in each month.

POST OFFICE REGULATIONS, AT POTTSVILLE, PA.

Hours of closing the Mails, from and after May 1st 1848.

To Philadelphia, Reading and intermediate places, at 8 o'clock, P. M., and 12 o'c. A. M.. daily, except Sundays, and arrives daily about 1 o'clock, P. M., & 6½ P. M.

To New York, Boston, &c., at 8 o'clock, P. M., daily except Sundays, and arrives daily about 1½ o'clock, P. M.

To Mauch Chunk, Allentown, Easton, &c., at 9 o'clock, A. M., daily, except Sundays, and arrives daily about 1 o'clock, P. M.

To Beaver Meadow, Wilkesbarre, &c., at 9 o'clock, A. M., daily. except Sundays. and arrives daily about 1 o'clock, P. M.

To Northumberland, Sunbury and intermediate places at 11½ o'clock, A. M., daily, except Sundays, and arrives daily about 8 o'clock. P. M.

To Danville, Williamsport, &c., at 11½ o'clock. A. M., daily. except Sundays, and arrives daily about 2 o'clock. P. M.

To Minersville, Llewellyn and Donaldson, at 11½ o'clock, A. M., daily, except Sundays, and arrives daily about 7 o'clock, A. M.

To Port Carbon and Norwegian, at 11½ o'clock, A. M., daily, except Sundays, and arrives daily at about 7 o'clock, A. M.

To Pinegrove, Jonestown, &c., to Harrisburg, at 8 o'clock, P. M.. on Mondays, Wednesdays and Fridays, and arrives the same days, about 9 o'clock, P. M.

Post Office Hours.

From 7 o'clock. A. M., till 9 o'clock, P. M.. except Sundays, when the office is open one hour, from 12 till 1 o'clock, P. M.

DANIEL KREBS, P. M.

LIST OF POST OFFICES IN THE COAL REGION, OUT OF SCHUYLKILL COUNTY.

Names of Offices.		*Postmasters.*
Hazlèton, Luzerne Co.,		Wm. A. Tubbs.
Beaver Meadows, Carbon Co.,		Wm. H. Cool,
Wilkesbarre, Luzerne Co,		Eleazer B. Collings,
Mauch Chunk, Carbon Co.,		Alex. Stedman,
Summit Hill,	do.	D. D. Broadhead,
Lehigh Gap	do.	Thomas Craig, Jr.
Wiconisco, Dauphin Co.,		Henry Schaeffer,
Susquehannah,	do.	Margaret Halback,
Linglestown,	do.	Thomas Barrett,
Dauphin,	do.	Thomas Milliken,
Halifax,	do.	A. W. Loomis,
West Hanover,	do.	J. S. Vanderslice,
Friendensville, Lehigh Co.,		A. L. Halback,
Lancon Valley,	do.	J. H. Wagner,
Coopersburg,	do.	Milton Cooper,
Catasaugua,	do.	Nathan Fegley,
Lackawanna, Luzerne Co.,		John Knapp.
White Haven,	do.	Edward Lockwood,
Wyoming,	do	John Breea,
Plainesville,	do.	Samuel Saylor,
Nescopeck,	do.	Israel Brun[illegible]age
Greenville,	do.	Moses P. Berry,
Carbondale,	do.	H. P. Ensang,
Beach Haven,	do.	Nathan Beach,
Shamokin, Northumberland Co.,		Joseph Zuern,
Mahoney,	do.	Wm. Jeppen,
Rush, Susquehanna Co.,		Almon Pickett,
Jackson Valley,	do.	Charles Campbell,

FOREIGN MAILS.

Notice to the Public, and Instructions to Postmasters—Post Office Department, March 1st, 1848.

1st. Letters to any Post Office in Bremen, Hamburg, Oldenburg, Hanover, Brunswick, Prussia or Saxony, in Germany, may be sent by United States Mail Steamers, Washington and Hermann, postage unpaid, or pre paid to destination, or pre paid to Bremen only, at the option of the sender.

U. States Postage,	if mailed at N. York	24 c. single,
"	if mailed within 300 miles of N York	29 "

U. States Postage, if mailed over 300 miles of N. York 34 c. single.

No additional Postage to Bremen.

Postage to be added, if to be pre paid to—

Hamburg,	6 c.	single.
Oldenburgh,	5	"
Hanover,	6	"
Brunswick,	6	"
Prussia,	12	"
Saxony,	12	"

Single letters limited to half ounce.

2d. Writers may pre pay to the following places and countries, or send unpaid, or they may pay the United States postage only: which last is advised.

Add to the United States postage (see above) if pre-paid:

To Leubec	9 c.	single.
Austria	18	"
Coburgh	15	"
Darmstadt	15	"
Baden	18	"
Gotha	13	"
Cassel	10	"
Bavaria	22	"
Frankfort on the Maine	13	"
Wertemburgh	21	"

Single letters limited quarter-ounce, except to Leubec and Gotha, which is limited to half ounce (foreign.)

3d. In the following cases it may be best to pay the United States postage only. Nevertheless, the writer may pay to destination or may send unpaid.

Postage in addition to the United States rate (see above)—

To Altona	6 c.	single.
Keil	11	"
Eastern towns of Italy	18	"
Constantinople	37	"
Copenhagen and Denmark generally	22	"
Stockholm and furthest part of Sweden	39	"
Burgen, Christiana and furthest part of Norway	28	"
St. Petersburgh or Comstadt	24	"
Alexandria, Cairo or Greece	37	"
Basle, and Switzerland generally	21	"

The single letter in Denmark, Sweden and Prussia, limited to half ounce, in the other countries on list No. 3, limited to the quarter ounce.

4th. On Newspapers and Pamphlets the U. States postage, and that only, is to be pre paid; 3 cents per Newspaper or pamphlet, with inland postage added, if mailed elsewhere than New York.

Memorandum.—Newspapers will be rated, abroad, with foreign letter postage, if printed in any other language than the English, and if enveloped otherwise than with narrow bands. Bremen delivery is an exception to this rule.

5th. Each letter is to be marked or stamped on the face, with the name of the office sending it, and on the back, with the name of the New York post office. If U. States postage only is pre paid, it is to be marked or stamped "Paid part" in *black*. If postage through is pre paid, it is to be stamped or marked in *red* "Paid all," and the amount of the foreign postage received is to be stated on the letter, in red. If the letter is unpaid, the U. States postage, in *black*, is to be stated.

C. Johnson, Post Master General.

Military of Schylkill County.

1st Regiment Schuylkill Co. Volunteers.

Colonel,	F. M. Wynkoop
Lieut. Colonel,	Daniel Larer
1st Major,	J. H. Graeff
2d do.	Nicholas Fox
Adjutant,	D. E. Nice
Quarter Master,	John E. Wynkoop
Surgeon,	Dr G H Brandner

2d Brigade Staff.

Brigadier General,	John M. Bickel,
Brigadier Major,	D. E. Nice
Brig. Quar. Master,	Michael Weaver
Brig Inspector,	Daniel Krebs.

1st Division Staff.

Major General,	Wm. H. Keim
Aid-de-Camp,	Levi Kline
Do.	D. W. O'Brien
Division Inspector,	James H Campbell
Div. Quar. Master,	E. Hartzell

Minersville Artillery.

Captain,	B C Christ
1st Lieutenant,	J Vernert
2d Do	William Hoch

Washington Artillerists.

Captain,	James Nagle
1st Lieutenant,	S. S. Nagle
2d Do.	F. B. Kaercher
3d Do.	Edward Rehr

Cavalry—1st Troop Light Horse.

Captain,	George C. Wynkoop
1st Lieutenant,	M. Mortimer
2d Do.	Daniel Shertle

Port Carbon Artillery.

Captain,	Peter Aurand
1st Lieutenant,	H. Guiterman
2d Do.	Daniel Hillegas
3d Do.	Jacob Metz

Union Artillery.

Captain,	Daniel Kitzmiller
Lieutenant,	John Strimpfler

National Light Infantry.

Captain,	E E Bland
1st Lieutenant,	I. Severn
2d Do.	Frank Pott
3d Do.	R. M. Palmer

Washington Yeagers.

Captain,	M Doerflinger
1st Lieutenant,	Peter Woll
2d Do	Peter Goddie

1st Regt. Schuylkill County Militia.

Major,	Daniel Hein
Adjutant,	John Minnig
Quarter Master,	Joseph Maurer
Surgeon,	William Link

2d Regiment.

Colonel,	Geo D Boyer
Lieut. Colonel,	Nicholas Jones
1st Major,	Daniel Moyer
2d Do,	Joshua Boyer
Adjutant,	Samuel Bossard,
Surgeon,	Dr. M Zulich

3d Regiment.

Lieut. Colonel,	John W. Heffner
1st Major,	— Lentz
2d Do,	Jacob Minnig
Surgeon,	Dr. J G Koehler
Assist. Surgeon,	A Holmes
Adjutant,	John Jones

4th Regiment.

Colonel,	John Silver
Lieut. Colonel,	John T Werner
Major,	Samuel M. Mills
2d Do,	Ross Bull
Adjutant,	Joseph F Seiders

Quarter Master,	H. A. Aechternacht
Surgeon,	Dr E Chichester
Assist. Surgeon,	Dr. Geo. H. Brandner

5th Regiment.

Colonel,	John F. Struthers
Major,	James Palmer,
Adjutant,	J. Dintinger,
Quarter Master,	Shaeffer
Surgeon,	Dr. Charles Leib,

6th Regiment

Colonel,	Isaac F. Davis,
Lieut. Colonel,	Francis Dengler
Major,	William Hoch
2d Do,	Philip Ozman
Adjutant,	David N. Lake
Quarter Master,	Daniel M. Weist
Surgeon,	Dr. William Link

Mahantango Volunteer Batatlion.

Major,	Daniel Hein
Adjutant,	John Minnig
Quarter Master,	Joseph Maurer
Surgeon,	Dr. William Link.

BOROUGHS.—POTTSVILLE.

Pottsville, the county seat, is the largest borough in the county, and the great mart of the Schuylkill Coal trade. It is situated on the Schuylkill, thirty-five miles from Reading, and is remarkably located, being embosomed in lofty hills which cluster in and around it. It was incorporated in 1823.

Population	in 1840,	3,200
Do	in 1845,	5,000
Do	in 1848,	7,500

Pottsville is 86 miles N. W. of Philadelphia, in a direct line, and 93 miles by the Philadelphia and Reading Rail Road; 58 miles N. E. of Harrisburg, and 256 miles N. E. of Pittsburg.

BOROUGH OFFICERS.

Benjamin T. Taylor, Chief Burgess.

Town Council.

E. W. McGinnis, Jas. M. Beatty, Hiram Rigg,	Term of service expires in 1849.
Wm. Wolf, F. H. Maurer, Daniel Shertle,	Term of service expires in 1850.
Henry Jenkins, Charles Lord, Thos. Foster,	Term of service expires in 1851.

Auditors.

Daniel Krebs, Richard Lee
Nathan Newnam

School Directors for Common Schools in Pottsville District.

Benjamin Pomroy,	J S C Martin
Benjamin Bannan,	George W Slater
Adam Shertle,	E Hammer

Societies, &c.

Ancient York Masons—Pulaski Lodge, No. 216

John Saunders,	W. M.
Edward T. Taylor,	S. W.
— Johnson,	J. W.
Dr. J C Carpenter,	Treasurer.
John S C Martin,	Secretary.

Grand Lodge.—United O. O. Fellows.

Robert M. Palmer,	R W G S.
Nicholas McCarty,	R R W G S
Richard Duncan,	D G S
M. H. Goram,	R W G Scribe
Nicholas McCarty,	Treasurer.
Thomas Johnson,	C. M

Meet at Stichter's Hall, last Saturday in April, July, October, and January.

I. O. O. Fellows.—Miner's Lodge, No. 20.

William Till,	N G
B. Erdman,	V G
John I. Jones,	Secretary.
J. S. C. Martin,	Treasurer.

Meet every Tuesday evening at Town Hall.

I. O. O. Fellows.—Hayden Lodge, No. 44.

David Brill,	N G
Chas. F. Kopitcsh,	V G
H. Schloss,	Secretary.
P. Kinsler,	Assis. Sect'y:
J. G. Brown	Treasurer.

Meet at Town Hall every Thursday evening.

I. O. O. Fellows.—Girard Lodge, No. 53.

J. L. Yoder,	N G
J. H. James,	V G
Doct. B. Becker,	Secretary.
— Hans,	Assis. Sect'y.
Daniel Shartle,	Treasurer.

Meet at Town Hall every Friday evening.

I. O. O. Fellows.—Lilly of the Valley Lodge. No. 281.

Thomas Foster,	N G
H A Aechternacht,	V G
L Womelsdorff,	Secretary
Jos S. Elliott,	Assis Sec'ty
Jacob D Rice,	Treasurer

Meet at Stichter's Hall every Friday evening.

U. O. O. Fellows.—Penn Lodge, No. 2.

Hiram Saxon,	N. G.
James Blackmun,	V. G.
Nicholas McCarty,	Rec Sect'y
R M Palmer,	Treasurer

Meet at Stichter's Hall every Saturday evening.

I. O. O. Fellows.—Franklin Encampment, No. 4.

John B Reed,	C P
Joseph L Yoder,	H P
G W Mortimer,	S W
Nathan Newnam,	J W
John J Jones,	Secretary
Daniel Shertle,	Treasurer

Meet at Town Hall, 1st and 3d Wednesday of each month.

United O. O. Druids.—Elvin Lodge, No. 18.

Nathan M Newnam,	N. A.
John W Shaw,	V. A.
Jacob D. Rice,	Sect'y
Daniel Shertle,	Treasurer

J Dunkhelberger, J. G.
Meet at Town Hall.

Sons of Temperance.—Pulaski Division, No. 160.

Isaac Huopt,	W P
James McAfee,	W A
Joseph Coatsworth,	P W P
Jacob Emhart,	Rec. Scribe
Daniel H. Leib,	Treasurer

Meet at Stichter's Hall every Tuesday evening.

Sons of Temperance.—Pottsville Division, No. 52.

George W Good,	W P
W. W. Bonnell,	W A
Charles M Ent,	P. W. P.
George W. Hughes,	Rec Scribe
Jas W Bowen,	Treasurer

Meet at Stichter's Hall every Wednesday evening.

United Order American Mechanics.—Council No. 55.

John M Schomo,	C.
——— ———,	V C
Charles Ent,	Treasurer
Henry Schomo,	F. S
Daniel Hill, Jr.,	Ex. C.

Meet at Stitcher's Hall, every Monday evening.

Mutual Mechanics Protection.

S L W Werman,	S. P.
John L Minnig, Jr,	J P
J L Yoder,	R S
D. A Smith,	F S
Hugh R Hughes,	Treasurer

Meet at Stichter's Hall every Monday evening.

Good Intent Fire Engine Company.

Charles Kaercher,	President
Wm W Jones,	Vice President
Thos F Beatty,	Rec Sect'y
E B Jackson,	Cor Sec'y
Albert Sillyman,	Treasurer.

Board of Directors.

Wm Beidlemen,	Charles Kaercher,
John H Gable,	Alexander Cake,
E B Jackson,	A Sillyman,

William Fox.

Pottsville Literary Senate.

Peter F Mudey,	President
Thomas D Kempton,	Vice Pres't
Chas S Wynkoop,	Secretary
J. S Elliott,	Treasurer

Meet at Town Hall every Tuesday evening.

Miner's Bank of Pottsville, Schuylkill Co.

John Shippen,	President
Charles Loeser,	Cashier
Isaac Beck,	Teller

Directors:

John Shippen,	George H Potts,
Nathan Evans,	Thos C Pollock,
Charles Miller,	James M Beatty,
D. R Bennett,	Benjamin Pott,
Thomas Evans,	Wm Mortimer, Jr.
Gideon Bast.	Elijah Hammer,

Joseph Richards.

Hibernia Benevolent Institution.—Incorporated in 1833.

Patrick Fogarty,	President
Bernard Riley,	Vice Pres't
Peter F Mudey,	Secretary
Michael Daly,	Treasurer

Benevolent Sons of Erin.

Owen Marin,	President
John McGinnis,	Vice Pres't
Peter F Mudey,	Secretary
Michael Riley,	Treasurer

Minersville.

Minersville is on the West Branch of the Schuylkill, four miles N. W. of Pottsville; it is built in the heart of a beautiful valley, and like the towns in the coal region generally, is remarkably healthy. It is the most important town on the West Branch, and next to Pottsville the largest in the county. It was laid out in 1829, and incorporated as a borough in 1831. The increase of its population in the last three years keeps pace with its early growth.

Population in	1845,	1,265
Do.	1848,	3,300

The Mine Hill Railroad, the Iron works of Mr. De Haven, and the mammoth coal works for breaking and screening coal, of Mr. Heilner, are among the conspicuous improvements of the neighborhood.

Societies, &c.

Independent O. O. Fellows—Social Lodge, No. 56.

Peter Stroup N G	D Conaway Sec'y
Joseph H Christ V G	J T Powell Treas'r

Meet at O F Hall, Wednesday evenings.

I. O. O. Fellows—Anthracite Lodge, No. 136

Wm H Charington N G	E P Burkhert Treas·
Wm Becker V G	D K Kressler Sec.

Meet at O F Hall, Friday evenings.

I. O. O. Fellows—Friendship Encampment, No. 60.

John Lazarus C P	M A Morgan Treas
John Montague H P	Peter Stroup J W
Wm Haynes G	Wm Baker S W
Wm Stroup Sec'y	

Meet at O. F. Hall, 1st and 3d Mondays in every month.

Ancient York Masons—Minersville Lodge, No. 222.

S P Gumpert W M	T T Jenkins Sec'y
Wm Sterner S W	S Heilner Treas.
J F G Kumsins J W	

Meet at O. F. Hall, on or after the first Monday of full moon.

United O. O. Fellows—Rising Sun Lodge, No. 10.

Samuel Lanagan N G	Wm Dyer Sec'y
Eman Hall V G	Wm Kelly N F & Treas
R B Duncan District G M	

Meet at U O O Fellows' Hall, Saturday evenings.

U O American Mechanics—Fidelia Council, No. 60.

S A Philips C	D Schurnker R S
Davis Evans V C	G I Lawrence F S
Wm F Kelly Ex C	C W Taylor Treas

Meet at Mechanics' Hall, Tuesday evenings.

Daughters of Temperance—Wreath of Friendship Union, No. 52.

Mary Dobbins P S	Ann Richards T
J W Thurlwell A S	Sarah Thurlwell C
Lucy A Zerby R S	Agnes Wythes A C
L A Jenkins A R S	Martha Jones A G
Amelia Prevost F S	

Meet at U O O Hall, Wednesday evenings.

Sons of Temperance—Cave Spring Division, No. 154.

John Morrison W P	L M Gabler A R S
Wm Templin W A	Miller F S
L E Jones R S	Philip Werner Treas

Meet at U O O Fellows' Hall, Monday evenings.

Schuylkill Haven.

Schuylkill Haven is situated on the left bank of the Schuylkill river, four miles below Pottsville, and immediately below the junction of the West Branch. At this point, the *West Branch Rail Road* connects with the Schuylkill navigation. Schuylkill Haven was laid out in 1829, by Mr. Danl. I. Rhodes and others, and differs from most of the towns in the Coal Region, being surrounded by fertile farms, instead of the rugged and bare mountains of the coal towns generally.

The population is estimated at 2,000.

Societies, Banks, &c.

Farmer's Bank of Schuylkill County.

Absal. Reifsnyder,	President
Jos. W Cake,	Cashier
J W Waggonseller,	Teller

Directors:

Hon George Rahn,	Alexander Cumming,
J Henry Adam,	F W Hughes,
Absal. Reifsnyder,	Henry Saylor,
John Zinn,	A J Brenner,
Augustine Holmes,	Daniel E Will,
Benjamin Lewis,	Thomas H Wilson,
One vacancy.	

Societies.

Sons of Temperance.—Mountain Spring Division, No. 153.

B W Hughes,	W. P.
Levi Lewis,	R. S.
R Kaercher,	F. S.
W Ungerhuhler,	C.
John Rader,	J. S.
J W Waggonseller,	W. A.
Franklin Feger,	A. R. S.
A Reifsnyder,	Treasurer.
Francis Shappel,	A. C.
David Gerger,	O. S.

Meet at Temperance Hall every Saturday evening.

United American Mechanics.—Metamora Council, No. 66.

G D Bowman,	C.
J. M Fager,	V. C.
Franklin Fager,	Ex C.
A G Quinlin,	R. S.
Henry Kipple,	F. S.
David Basehore,	Treasurer.

Meet at Temperance Hall every Thursday evening.

Port Carbon.

This town is built on the main branch of the Schuylkill, two miles above Pottsville, and at the termination of the Schuylkill Navigation. The town was laid out in 1828, by several enterprising individuals, among whom may be named Messrs. Abraham Pott, Jacob W. Seitzinger, William Lawton, and Daniel J. Rhoades. The Schuylkill Valley Rail Road, with its numerous lateral roads, connect with this point, and leads a large business to the town.

Estimated population, 2200.

Societies, &c.

In. O. O. Fellows—Schuylkill Lodge, No. 27.

James N Benner, N G	Philip May, Sec'y
Wm. H King, V G	Sam'l B Young, Tr.

Sons of Temperance—Reliance Division.

Wm Berger, W P	Jacob Wentz, R S
Charles Ferabee, W A	Rob't Jackson, Treas

Orwigsburg.

Orwigsburg is situated in a pleasant, fertile valley, 8 miles S. E. of Pottsville, on the Reading and Sunbury turnpike. The town was laid out by Peter Orwig in 1796, and incorporated into a borough in 1813. As the former county seat, it contains the usual county buildings, an academy, and three churches.—The neighborhood presents many thriving farms and fruitful orchards, the property of honest and industrious German farmers. Estimated population 900.

Societies, &c.

Indepen't O O Fellows—Grace Lodge, No. 157

Daniel K Graeff V G	D F Burkert A Sec
F B Dreher V G	Isaac Orwig jr. Treas
G D Boyer Sec	

Meet at Odd Fellows' Hall, Saturday evenings.

Ancient York Masons—Schuylkill Lodge, No. 138.

H Hesser W M	John M Bickel Treas
John G Koehler S W	Wm B Potts Sec
Wm G Gulden J W	

Meet in the Court Buildings, on or after the first Tuesday of full moon.

Tamaqua.

Tamaqua is situated on the Little Schuylkill, 15 miles East of Pottsville, between the Sharp and Locust mountains. The town was first projected and laid out by the Lehigh Coal and Navigation Company in 1829; it is fast growing in importance and population, and presents the appearance of a busy, thriving borough.

Population in 1845,		465
Do.	1848,	3,000

Societies, &c.

I O O Fellows—Harmony Lodge, No. 86.
Jacob Strothers N G Benj. T Hughes C S
Christian Carter V G J Harlan Treas
Thos. P Simmons R S
Meet on Monday evenings.

Towns, &c.

St. Clair is situated three miles North East of Pottsville, on the Mill Creek Railroad. The town is rapidly increasing in population, and, from its convenient location, at and near many large Coal operations, promises to be a thriving, busy place.
Estimated population 1400.

Heckshervile, is a new town on the West West Branch eight miles North West of Pottsville, at and in the immediate vicinity of Messrs. Payne, Hecksher, and the Forest improvement Company's mines. The inhabitants are principally miners.
Estimated population 900.

Tremont is situated thirteen miles South West of Pottsville; it is a town of recent growth (scarcely two years old) and has been built up entirely through the enterprise of Messrs. Samuel B. Fisher, Robert Morris, Howell Fisher, & Co., the proprietors of the land—these gentlemen having afforded facilities to settlers by the willing disposal of town lots for building, &c.
Estimated population 800.

Donaldson is one mile North West of Tremont, it was laid out by Judge Donaldson, from whom it takes its name. After a series of years spent in developing the resources of the neighborhood, and in drawing together a settlement of industrious miners and mechanics, its enterprising proprietor is now reaping a rich and deserved harvest.
Estimated population 700.

Llewellyn is two miles South of Minersville, on the West West Branch of the Mine Hill & Schuylkill Haven Railroad. It was originally settled by Welsh miners, attracted thither by the increased growth of the Coal trade in that neighborhood.
Estimated population 550.

Pinegrove is situated on the Swatara, between the Kittatinny and Second Mountain, seventeen miles South West of Pottsville. A branch of the Union Canal connects here with a Railroad from the Coal mines on Lorberry Creek; short lateral roads, from various collieries, extending as far up as the main branch of the Swatara, intersect and lead to the main road.
Estimated population 500.

Brockville is built on the Schuylkill Valley Railroad, nine miles East of Pottsville. The inhabitants are principally miners, employed in the extensive collieries of George H. Potts, Esq., on the estate.
Estimated population 500.

Middleport is situated on the Schuylkill Valley Railroad, eight miles East of Pottsville. Its trade is altogether local; depending for support upon the Coal trade of the neighborhood. Population, 400.

New Castle is four miles North of Pottsville, on the Sunbury turnpike; it occupies a high, mountainous position and increases but slowly in trade and population.
Estimated population 300.

Tuscarora is twelve miles East of Pottsville, and is situated at the termination of the Schuylkill Valley Railroad. Present prospects augur an increasing trade.
Estimated population 300.

Patterson is situated on the Schuylkill Valley Railroad, nine miles East of Pottsville.
Estimated population 200.

Luzerne County.

Luzerne is bounded, East by Wayne, North by Wyoming and Susquehanna, West by Lycoming and Columbia, South by Schuylkill and Carbon, and South East by Monroe.—Area 1400 square miles.

The mountains are the *Allegheny*, broken into large detached masses and irregular hills, the *Lackawannack*, *Nanticoke*, *Shawnee*, *Moosic*, *Wyoming*, *Nescopeck* and *Buck*.

The streams are the *Susquehanna*, or *North Branch* river, and the *Lehigh*. The creeks are the *Lackawanna*, *Wapwalopen*, *Nescopeck*, *Huntingdon*, *Shickshinny*, *Hemlock*, *Bear* and *Harrey's*.

Luzerne contains 33 townships, 3 boroughs and several thriving villages. Wilkes Barre is the Seat of Justice. Carbondale and Wilkes Barre may be noted as depots for the Coal trade of the county, and as deriving a flourishing business therefrom.

The public improvements are the North Branch Canal, the Railroad of the Lehigh Company from Wilkes Barre to White Haven; and a Railroad from Carbondale to Honesdale in Wayne county—several turnpikes, and a large Bridge over the Susquehanna at Wilkes Barre.

Population in 1840,		33,000
Estimated do	1848,	40,000

Carbon County.

Carbon adjoins Schuylkill, and is bounded N. E. by Monroe, N. W. by Luzerne, and S. E. by Northampton and Lehigh. Area 400 square miles. Its principal mountains are *Mauch Chunk*, *Broad*, *Pokono*, *Spring*, *Baldridge*, and the *Kittatinn*, forming its S. E. boundary.

The streams are the *Lehigh river* and the *Aquanchicola*, *Big*, *Lizard*, *Mahoning*, *Mauch Chunk*, *Nesquihoning*, *Quaquake* and *Hays' Creeks*. Carbon contains eight townships and several towns and growing villages.

The public improvements are the works of the Lehigh canal and Slackwater Navigation Company along the Lehigh; the Beaver Meadow Railroad, and the Lehigh Coal and Navigation Company's Railroad, and inclined plane from Summit Hill to Mauch Chunk.

Mauch Chunk is the Seat of Justice. A great quantity of coal is shipped yearly from the various collieries of the Lehigh Coal and Navigation Company.
Estimated population, 15,000.

Northumberland County.

Northumberland is bounded on the East and North East by Columbia county, North by Lycoming, West by Union, South by Dauphin, and South East by Schuylkill. Area 500 square miles.

Its mountoins are the *Line*, *Little*, *Mahanoy*, and *Big Mountains*, in the South; the *Shamokin Hill*, in the middle; *Montour's Ridge*, celebrated for its iron ore, and *Limestone Ridge*, North of the North Branch; and the *Muncy Hills* in the extreme North.

The streams are the North and West Branches of the *Susquehanna*, uniting at the town of Northumberland, thence forming the *main* Susquehana river, at the western extremity of the county; the creeks are *Mahantango*, *Mahanoy*, *Shamokin*, *Roaring*, *Chillesquaque* and *Limestone*.

This county contains 17 townships, 3 bo-

roughs and several growing towns and villages. Sunbury is the Seat of Justice.

Population in 1840,		20,027
Estimated do	1848,	25,000

Dauphin County.

Dauphin is situated partly in Cumberland Valley, and partly in the Anthracite region; it is bounded E. by Lebanon and Schuylkill, N. by Northumberland, W. by Perry, Cumberland and York, and S. by Lancaster. Its area is 530 square miles. This county contains 19 townships, 4 boroughs and many growing villages; and is celebrated for the *Bituminous* and *Anthracite Coals* mined from the extensive collieries of the Dauphin Coal Company.

Population in 1840,		30,118
Estimated do.	1848,	37,500

Harrisburg is the county seat.

Poetry.

THE MINER LAD.

Nay, don't despise the Miner-lad,
Who burrows like the mole;
Buried alive, from morn to night,
To delve for household coal—
Nay, miner-lad, ne'er blush for it,
Though black thy face be, as the pit!

As honorable thy calling is
As that of hero lords,
They owe to the poor Miner-lad
The ore that steels their swords—
And perils, too, as fierce as theirs
In limb and life, the Miner shares!

Ye gayest of the gaudy world,
In gold and silver bright,
Who, but the humble Miner-lad,
Your jewels brought to light?
Where would be your gold and silver,
But for yonder delver?

Ye brows of pearly diadems,
Who sit on lofty thrones,
Smile gently on the Miner-lad
Who wrought your precious stones.
And rescued from their iron bond
The ruby and the diamond!

Ye instruments of brass, that pierce
The ear with trumpet sound,
Your notes, but for the Miner-lad,
Had slumbered under ground—
Nor imaged bronze, nor brazen gate,
Had graced the trophies of the great!

Then don't refuse the Miner-lad
The crust of bread—his prayer!
Beneath that blackest face of his
He hides a heart as fair!
The toil of his bare brawny arm
All, all our hearts and houses warm!

KNOW YE NOT THAT YE ARE MEN!

Know ye not that ye are men,
Ye laboring throngs of earth?
Must ye be told, and told again,
What truth and toil are worth?

Why do ye look upon the ground?
No fire within the eye,
When noble-born are all around,
And wealth and rank go by?

For have ye not a heart within,
And sense and soul as they?
And more—have ye not *toiled* to win
The bread ye eat to-day?

Do ye despise your sunburnt hands—
So hard and brown with toil,
That have made fair the forest lands
And turned the forest soil?

What! do ye fear the haughty gaze,
Of men in rich array?
'Tis said pride hath not many days,
And riches fly away.

Up, heart and hand, and persevere,
And overcome the scorn—
The haughty hate and heartless sneer,
Of this world's gentle born!

Fear not—shrink not—to you is given
The guardianship of earth;
And on the record book of Heaven
Is writ your honest worth!

Honor yourselves! ye honest, true,
And willing, firm, and strong!
Do well whate'er your hands may do,
Though praise may linger long!

A high and holy work is yours,
And yours shall be a fame,

That lives for ages, and endures
Beyond the hero's name!

Go—with your hand upon the plough.
And the plough beneath the sod;
Pity the heart that scorns, and bow
To nothing but your God!

LABOUR.

Ho! ye who at the anvil toil,
And strike the sounding blow,
Where, from the burning iron's breast,
The sparks fly to and fro!
While answering to the hammer's ring,
And fire's intenser glow—
Oh! while ye feel 'tis hard to toil
And sweat the long day through,
Remember, it is harder still
To have no work to do.

Ho! ye who till the stubborn soil,
Whose hard hand guides the plough,
Who bend beneath the summer sun,
With burning cheek and brow—
Ye deem the curse still clings to earth
From olden time till now,
But while ye feel 'tis hard to toil,
And labour all day through,
Remember, it is harder still
To have no work to do.

Ho! ye who plough the sea's blue field—
Who ride the restless wave—
Beneath whose gallant vessel's keel
There lies a yawning grave;
Around whose bark the wintry winds,
Like fiends of fury rave.
Oh! while ye feel 'tis hard to toil,
And labour long hours through,
Remember it is harder still
To have no work to do.

Ho! ye upon whose fevered cheeks
The hectic glow is bright,
Whose mental toil wears out the day,
And half the weary night—
Who labour for the souls of men,
Champions of truth and right;
Although you feel your toil is hard,
Even with this glorious view,
Remember, it is harder still
To have no work to do.

Ho! all who labour—all who strive—
Ye wield a lofty power:
Do with your might—do with your strength—
Fill every golden hour!
The glorious privilege to do,
Is man's most noble dower,
Oh! to your birthright and yourselves,
To your own souls be true!
A weary, wretched, life is theirs,
Who have no work to do.

THE SONG OF STEAM.

Harness me down with your iron bands—
Be sure of your curb and rein;
For I scorn the power of your puny hands,
As the tempest scorns a chain.

How I laugh'd, as I lay conceal'd from sight,
For many a countless hour,
At the childish boast of human might,
And the pride of human power.

When I saw an army upon the land—
A navy upon the seas,
Creeping along—a snail-like band—
Or waiting the wayward breeze;
When I mark'd the peasant faintly reel
With the toil which he daily bore,
As he feebly turn'd at the tardy wheel,
Or tugg'd at the weary oar:

When I measur'd the panting courser's speed—
The flight of the carrier dove—
As they bore a law that the king decreed,
Or the lines of impatient love—
I could not but think how the world would feel,
As these were outstripped afar,
When I should be bound to the rushing keel,
Or chain'd to the flying car.

Ha! ha! ha! they found me at last—
They invited me forth at length—
And I rush'd to my throne with thunder blast,
And laugh'd in my iron strength.
Oh! then ye saw a wond'rous change
On the earth and ocean wide,
Where now my fiery armies range,
Nor wait for wind or tide.

Hurrah! hurrah! the waters o'er—
The mountains' steep decline,
Time—space have yielded to my power;
The world—the world is mine!
The rivers, the sun hath earliest blest,
Or those where his beams decline—
The giant streams of the queenly West,
Or the orient floods divine:

The ocean pales where'er I sweep,
To hear my strength rejoice,
And the monsters of the briny deep
Cower, trembling at my voice.
I carry the wealth and the lord of earth—
The thoughts of the god-like mind;
The wind lags after my flying forth—
The lightning is left behind.

In the darksome depths of the fathomless mine
My tireless arms doth play,
Where the rocks never saw the sun decline,
Or the dawn of the glorious day.
I bring earth's glittering jewels up
From the hidden cave below,
And I make the fountain's granite cup
With a chrystal gush o'erflow.

I blow the bellows—I forge the steel
In all the shops of trade;
I hammer the ore and turn the wheel
Where the arms of strength are made;
I manage the furnace—the mill—the mint;
I carry—I spin—I weave;
And all my doings I put into print
On every Saturday eve.

I've no muscle to weary—no breast to decay
No bones to be "laid on the shelf:"

And soon I intend you may "go to play,"
While I manage the world by myself.
But harness me down with your iron bands—
Be sure of your curb and rein;
For I scorn the strength of your puny hands,
As the tempest scorns a chain.

THE MINERS' DOOM.

Written for the London Mining Journal, by the Author of the "Syne Exile's Return."

'Twas evening, and a sweeter balm on earth was never shed,
The sun lay in his gorgeous pomp on ocean's heaving bed,
The sky was clad in bright array, too beautiful to last,
For night, like envy, scowling came, and all the scene o'ercast.
'Tis thus with hope—'tis thus with life, when sunny dreams appear,
The infant leaves the cradle-couch to slumber on a bier;
The rainbow of our cherish'd love, we see in beauty's eye.
That glows with all its mingled hues, alas! to fade and die:
'Tis dark, still night, the sultry air scarce moves a leaf or flower;
The aspen, trembling, fears to stir, in such a silent hour;
The footsteps of the timid hare, distinctly may be heard
Between the pauses of the song of night's portentous bird,—
And in so drear a moment, plods the miner to his toil,
Compelled refreshing sleep to leave, for labor's hardest moil:
By fate's rude hand, the dream of peace is broken and destroyed—
The savage beast his rest can take, but man must be denied!
And why this sacrifice of rest?—did not the Maker plan
The darksome hours for gentle sleep, the day for work by man?
Yes!—but the mighty gods of earth are wiser in their laws—
They hold themselves with pride to be their Creator's first great cause.
The miner hath his work begun, and busy strokes resound,
Warm drops of sweat are falling fast—the Coal lies piled around.
And what a sight of slavery!—in narrow seams compressed
Are seen the prostrate forms of men to hew on back and breast,
Fainting with heat, with dust begrimed, their meagre faces see,
By glimmering lamps that serve to show their looks of misery.
And oft the hard swollen hand is raised to wipe the forehead dews;
He breathes a sigh for labor's close, and then his toil renews.
And manly hearts are throbbing there—and visions in that mind
Float o'er the young and sanguine soul, like stars that rain and shine.
Amid the dreariness that dwells within the cavern's gloom
Age looks for youth to solace him—waits for his fruits to bloom.
Behold! there is a careless face bent from yon cabined nook;
Hope you may read in his bright eye—there's future in his look;
Oh, blight not, then, the fairy flower, 'tis heartless to destroy
The only pleasure mortals know—anticipated joy!
Oh, God! what flickering flame is this?—see, see again its glare!
Dancing around the wiry lamp, like meteors of the air.
Away, away?—the shaft, the shaft!—the blazing fire flies;
Confusion!—speed!—the lava stream the lightning's wing defies!
The shaft!—the shaft!—down on the ground, and let the demon ride
Like the sirocco on the blast—volcanoes in their pride!
The choke-damp angel slaughters all—he spares no living soul!
He smites them with sulphureous brand--he blackens them like coal!
The young—the hopeful, happy young—fall with the old and gray,
And oh, great God! a dreadful doom, thus buried to decay
Beneath the green and flowery soil whereon their friends remain—
Disfigured, and perchance, alive—their cries unheard and vain?
Oh, Desolation! thou art now a tyrant on thy throne,
Thou smilest with sardonic lip to hear the shriek and groan!
To see each mangled, writhing corse to raining eyes displayed—
For hopeless widows now lament, and orphans wail dismayed.
Behold thy work! The maid is there, her lover to deplore;
The mother wails her only child, that she shall see no more;
An idiot sister laughs and sings—oh, melancholy joy!—
While, bending o'er her brother dead, she opes the sightless eye.
Apart, an aged man appears, like some sage David oak,
Sheding his tears, like leaves that fall beneath the woodman's stroke;
His poor old heart is rent in twain—he stands and weeps alone—
The sole supporter of his house, the last, the best is gone!
This is thy work, fell tyrant!—this the miner's common lot!
In danger's darkling den he toils, and dies lamented not.
The army hath its pensioners—the sons of ocean rest,
When battle's crimson flag is furled, on bounty's downy breast;
But who regards the mining slave, that for his country's wealth
Resigns his sleep, his pleasures, home, his freedom and his health?
From the glad skies and fragrant fields he cheerfully descends,
And eats his bread in stenchy caves, where his existence ends.
Aye, this is he whom masters grind, and level with the dust—
The slave that barters life, to gain the pittance of a crust.
Go, read your pillard calendar, the record that wll tell
How many victims of the mine in yonder churchyard dwell.
Hath honor's laurels ever wreatqed the despot's haughty brow?—
Hath pity's hallowed gems appeared when he in death lay low?
Unhonored is his memory, despised his worthless name—
Who wields in life the iron rod, in death no tear can claim!

STATISTICAL TABLE OF MINING OPERATIONS,

Exhibiting a condensed view of statistical facts, connected with Mines and Mining in the Anthracite Coal Regions of Pennsylvania.

Annexed we present to the reader a "Statistical Table," embracing (with very few exceptions) all the Coal operations in the Anthracite Coal Regions of Pennsylvania. This table, it will be seen, is intended to present at a glance, all the useful information connected with each operation; the names of proprietors; amount of coal shipped; capacity for shipping; number of engines in use, with the quantity of power; number and length of slopes, tunnels, drifts, &c.; number of veins, thickness of each and the kinds of coal; how the coal is shipped; names of land owners, &c. &c. In collecting the necessary facts for a plain and condensed statement, such as we offer our readers, much difficulty has been encountered; notwithstanding we have visited personally nearly all the coal mines in the Anthracite region, at the expense of much time, labor and money, to obtain correct statistics, we have had in some instances to depend upon second hand sources for a few details, not being able to see the proprietors during our visits. The few operators not noted in our table, are unavoidably omitted; the proprietors, in most cases, refusing to give us the desired information; while others have neglected to fill up and return the blank report sent to them. The amount of Coal shipped, as exhibited by each, may, in some instances, possibly be slightly exaggerated from the actual shipments heretofore made; the operators, in such cases, calculating upon the capacity for shipping from the quantity of Coal mined. Generally, however, the figures may be depended on as correct.

When the magnitude of this apparently simple undertaking is seriously considered, with the many obstacles continually in the way of our complete success, we trust all critical opinions will be suspended. We have gleaned all we could, and have only to regret that a few of the prominent Coal proprietors in the region, from certain private reasons, have thought proper to withhold from the reading world a matter of such general and useful import.

NAMES OF COAL OPERATORS.	No. of Slopes.	No. of Drifts.	No. of Tunnels.	No. of Gangways.	Length of Slopes.	Length of Drifts.	Length of Tunnels.	Length of Gangways.	No. of Veins.	Names of Veins.	Thickness of Coal.	Kind of Coal.	Where situated.	No. of Engines.	Horse power of Breaker Engine.	Horse Power of Hoisting Engine.	Horse Power of Pumping Engine.	How the Coal is Shipped.	Yearly amount of Coal shipped.	Remarks.	Names of the Proprietors of Coal Lands.
													Schuylkill County.								
George Spencer & Co.,	1				700 feet,				1	Spohn vein,	7 to 10 ft	Red Ash,	West Norwegian,	2	20	60		Rail Road,	20,000 tons,	Spohn Colliery;	Nicholas E. Thouron
Henry Pryor,	1	1			opening,	200 yards,			1	Orchard do.	5 to 25 ft	Grey Ash,	2 m. above Minersville,	1		8		Do.	10,000	Herbine Tract;	Brock Colp & Hammer
David Brown & Co.,	1	1			100 feet,	1200 do.			1	Primrose do.	6 to 9 ft	Do.	Oak Hill,	2	12	30		R. Road & Canal,	20,000	Oak Hill do.	Wetherill's
R. Hecksher,		2	1			400 do. each			1		8 to 10 ft	White Ash,	Taylorville,	1	15			Rail Road,	30,000	New opening;	Forest Improvement Co.
John Spencer,		3				200 do. each			1		8 to 10 ft	Red Ash,	Taylorville,	1	15			Do.	20 to 30,000		Do.
Thomas Williams,		1				600 yards.			1		8 to 10 ft	Red Ash,	Taylorville,	1	10			Do.	10,000		Do.
Jas. C. Oliver,	3				2—120 yds. 1—70 do.				4	Lewis, Spohn, Clarkson & Yard,	3½ to 5 ft	Red Ash,	Combola,	1	20			Do.	25,000	2½ m. E. of Port Carbon;	Bell & Hubly
Do.	1				60 yards,				1	Peach Mountain,	2 to 12 ft	Red Ash,	Silver Creek,	1		60		Do.	new colliery,	Glentworth Colliery;	Alspach & Best
Do.		4	1			150 to 450 yds	40 yards,		4		5 to 20 ft	White Ash,	Silver Creek,	1	20			Do.	40,000 tons,	1¼ m. from N. Philadelphia;	Valley Furnace Co.
Do.			1				opening,		4		4 to 7 ft	White Ash,	Tuscarora Mountain,	1	20			Do.	15,000	Not yet developed;	Samuel, Bell & Lea
Do.	1				90 yards,				3		6 to 12 ft	2-do. 1-Red Ash	Above Tuscarora,	2	20	60		Do.	20,000		Stevenson, Struthers & Co.
George H. Potts,	1				408 feet,				2	Black & Selkirk,	4½ to 6 ft	Red Ash,	York Farm,	3	10	60	30	Do.	not shipping,	Making improvements;	Lea, Hart & Miners' Bank
Do.	1				1018 do.				6				York Farm, Orchard,	3	30	40	90	Do.	55,000 tons,	Slope 32 ft. wide, 7 ft. high;	Do
T. & W. Pollock,		2							5				Mill Creek,	1	10			Do.	20,000	Near Port Carbon;	Seitzinger & Wetherill
Robert Adams & Co.	1				130 yards,				1	Mammoth vein,	20 ft.	White Ash,	Broad Mountain,	2	20	60		Do.	40,000	Pine Knot Colliery;	Chas. Miller, Patterson & Co
Samuel Sillyman,		4				2 miles in all,			3	Middle & Rainbow,	7 to 22 ft	White Ash,	3 m. N. of Port Carbon,					R. Road & Canal,	32 to 40,000	Rainbow do.	Seitzinger Wetherill & Co.
Morgan & Hines,	1			2	75 yards,			250 yards,	1	Little Diamond,	4 to 5 ft	Red Ash,	Oak Hill,	1		20		Rail Road,	10 to 12,000	Little Diamond do.	In dispute: Jas. Sillyman, Agt.
Sillyman & Fister,		2				10 to 1500 yds			2	Rainbow,	7 to 22 ft	White Ash,	St. Clair,	1	20			Canal,	25,000	St. Clair do.	Seitzinger & Wetherill
Robert Adams & Co.,	1				opening,				1	Mammoth vein,	20 ft.	White Ash,	Broad Mountain,	1		60		Rail Road,	50,000	Pine Knot do.	Miller, Patterson, Dundas & Co
Charles Miller,	1				200 yards,				1	Black Heath,	6 to 7 ft	Red Ash,	Pottsville,	3	20	50	30	Do.	20,000	Guinea Hill do.	Lea, Kimber & Co.
James C. Oliver,	2				1—75 do. 1—240 do.				2	Lewis and Spohn,	4½ ft.	Red Ash,	Bellemont,	1	20	50	30	Do.	35 to 40,000	1½ m. E. of Port Carbon;	Samuel Bell
Caleb Parker,		3				600 yards,			6	Gate veins,	3 to 7 ft	Red Ash,	New Philadelphia,	1	15			Canal,	15 to 20,000	Gate vein Colliery;	Wetherill, Patterson & Co.
Marschall & Thomas,				3					3		3½ to 8 ft	Red Ash,	Lich Run,					Rail Road,	new operation	¾ m. above New Philadelphia;	Joseph S. Silver
Neill & Oliver,		1	2			120 do.	45 yards,		4	Diamond veins,	4 to 10 ft	Red Ash,	N. E. of New Philadelphia	1	10			Do.	5 to 8,000 tns.	Diamond Colliery;	Valley Furnace Co.
Doubty & Rosser,	2			6	1—74 yds. 1—180 do.				3	Peach Mountain, Little Tracy, Big Tracy,	3 to 10 ft	Red Ash,	East Norwegian,	3	15	60	40	Do.	40,000	East Delaware Mines;	Delaware Coal Co.
B. & W. Murray,		1				300 do.			1	Diamond,	4½ to 12 ft	Red Ash,	N. E. of New Philadelphia					Canal,	3,000	Knickerbocker Mines;	Valley Furnace Co.
J. & C. Reed,	2				1—70 yds. 1—131 do.				1	Peach Mountain,	5 to 10 ft	Red Ash,	Norwegian Township,	3	15	60	40	Rail Road,	20 to 30,000	West Delaware Mines;	Delaware Coal Co.
J. Greenawault,		1		1		600 do.			1		5 ft.	Red Ash,	At Tremont,					Do.	4,000	Above water level;	Greenawalt & George
Colt, Gaskins & Lomason,		1		1		600 do.			1	Big vein,	22 ft.	White Ash,	Donaldson,	water	power,			Do.	20,000	Do.	Donaldson Coal Co.
Harvey, Steese & Co.,		1		2					1		10 ft.	White Ash,	Donaldson,	1	15			Do.	new operation	Do.	Do
																		Canal,	Do	Largest Red Ash vein in the region;	Swatara Coal Co.
Wheeler & Miller,		1	1						1	Long Creek vein,	20 ft.	Red Ash,	3 m. West of Tremont,	1	15			Rail Road,	50,000 tons.	Steam Saw Mill at mines;	Wetherill, Patterson & Co.
E. W. M'Ginnis,	1				100 yards,				4	Lewis, Spohn, Palmer & Potts veins		Red Ash,	New Philadelphia,	3	20	60	20	Do.	25,000	Gate vein Colliery;	M'Ginnis & Farnum, Star, Biddle & Co.
Do.	2				each—90 do.				4	Gate veins,		Red Ash,	Pottsville,	3	20	60	60	Do.	not shipping,	Horse power;	M'Ginnis & Farnum,
Do.									4			Red Ash,	Port Carbon,					Do.	10,000 tons,	Do.	In dispute: J. Sillyman, Agt.
Pugh & Pollock,		1				400 do.			1	Flat vein,	4½ ft.	Red Ash,	Oak Hill,					Do.	40,000	Forestville Colliery;	Forest Improvement Co.
Wm. Pothrick,		5				3 to 800 yds.			1		5 to 8 ft	White Ash,	West West Branch,	1	15			Do.	15 to 20,000	Primrose Mine;	Bonsall, Cummings & Co
John Flood,	1				80 yards,				2	Primrose veins,	4½ to 6½ ft	Red Ash,	3 m. N. of Pottsville,	horse	power,						
Jos. F. Taylor,	1		1		115 do.		40 yards,		3	Diamond, Little & Kockill veins,	2 to 6 ft	Red Ash,		2	10	30		R. Road & Canal,	25 to 30,000		Joseph F. Taylor
George Mason,		2							2	Clarkson,	6 to 8 ft	Red Ash,		horse	power,			Rail Road,	7 to 8,000		Thomas Haven
Snyder & Barr,		2				3 to 500 yds.			2		4 to 10 ft	Grey Ash,	¼ m. above Tremont,	1	15			Do.	8,000	Worked by rotary engine;	Swatara Coal Co.
Heil & Bower,		2				5 to 900 do.			2	Heil & Bower,	3 ft.	Grey Ash,	Do	1	15			Do.	15,000	Use Umboltz's Patent Breaker	Do
Henry Eckel,		1							1	Big vein,	22 ft.	White Ash,	Near Donaldson,					Do.	20,000	Above water level;	Donaldson Coal Co.
Reinoehl & Gardner,		2							1		7 ft.	White Ash,	Do.	1	10			Do.	15,000	Do.	Do
Morris & Fisher,		4				160 to 500 yds			4	Tremont veins,	1–12 ft 3–5 ft.	Red Ash,	At Tremont,	1	20			Do.	10,000	New operation;	Swatara Coal Co. and others
Sillyman & Reed,		4				260 yds.			2	Barclaugh & Ettany	7 ft.	Red Ash,	2 m. E. of Port Carbon,	1	15			R. Road & Canal,	15,000		B.W. Wister & Thos. Sillyman
George H. Potts,	1	2			300 feet.				2		8 to 9 f.		Brockville,	2	15	50		Rail Road,	40,000 tons,	On Brockville Estate;	Brock & Cumming
Gideon Bast & Co.,	2	3			1—35 yds. 1—60 do.				4	Green Park vein, Reese Davis do., Tunnel & Diamond,	3 to 8 ft	Red Ash, White Ash,	Wolf Creek,	3	1-10 1-15	50		Do.	56,000	1 m. above Minersville;	Wadsworth, Wharton, Kimber & Co.
Jacob Serrill,			2				2 miles,		2	Blk Heath & Blk Valley,	6 to 8 ft		Wolf Creek,					R. Road & Canal,	26,000 *	Do.	Gideon Bast
John Pinkerton,			1						4		4 to 21 ft	White Ash,	St. Clair,	1	25			Rail Road,	50,000	West of Millcreek;	Wetherill, Seitzinger & Co.
Thos. C. Williams,												White Ash,	Mount Laffy,							West Branch;	Refuses to give information:
John Rosser & Co.,												Grey Ash,	Oak Hill,								
Hooler & M'Cowen,		1							2		6 to 8 ft	Red Ash,	Oak Hill,	horse	break'r			Canal,		3½ m. S W. of Pottsville;	Wetherill's
Jonathan Wasley,												Red Ash,	2¾ m. N. of Pottsville,							Wadesville;	Cumming, Bonsall & Co.
Fitzsimmons & Glenn,		1	1			130 yards,	80 yds.		2	Flowery Field,	3 to 6 ft	Red Ash,		horse	power,						Do
Daniel Edwards,												Grey Ash,							20 to 25,000		
Job Rich,												Red Ash,	York Farm,								Lea, Hart & Miners Bank
Charles Miller & Co.,	1	5	1	2	70 yards,		200 yds.		5	Diamond, Peach Mountain,	2 to 8 ft	Red Ash,	W. West Branch, near Minersville,	2	20	60		Rail Road,	40,000	Phœnix Colliery;	R. W. Packer
J. D. Steinberger,									2	Pott & Clarkson,	2 to 5 ft	Red Ash,	Milford,	1	20			Do.		Near Middleport;	Brooke, Rabb & Co.
Do.									2	Palmer & Spohn,	Do.	Red Ash,	Woodburn,	1	20			Do.		Do.	Wood, Dwey & Co.
Do.									2	Lewis & Yard,	Do.	Red Ash,	Boshey,					Do.		Do.	Sellers, Davie & Co,
Rogers, Sinnickson & Co.	2		1	many	240 feet, 420 do.		80 yds.	1000 yds.	2	Lewis & Clarkson,	8 to 9 ft	Red Ash,	Near Pottsville,	3	20	70	35	Do.	50,000	N. American Mines;	N. American Coal Co.
Do.	2			3	350 feet, 150 yds.			1000 yds. 700 do. 800 do.	6	Pch Orchard, Blk Heath, Raven, Luther, Black Valley, & North veins,	5 to 25 ft	White Ash, Red Ash,	2 m. S. E. of Middleport,	3	20	60	60	Do.	50,000	New veins opening:	Spayd & Luther
M'Cormick & Clark,		1				500 yards,			1	Bonewitz,	3 to 4 ft	Grey Ash,	Near Donaldson,	1	10			Do.	new operation	Above water level;	Donaldson Coal Co.
H. Eckel,			1	3		100 to 600 yds			3	Tunnel veins,	4 to 7 ft	Red Ash,	Near Tremont,	1	12			Do.	20,000 tons,	Do	Do
Spangler & Barndt,		2				250 to 550 do.			1		11 ft.	White Ash,	Donaldson,	1		20		Do.	25,000	Do	Donaldson Coal Co.
Milnes, Haywood & Co.,	1				[illegible]0 feet,				1	Salem vein,	3 to 4½ ft	Red Ash,	West West Branch,	2	15	30		Canal,	18,000	7 m. above S. Haven;	James Cresson & Bro's.
Do.	1				350 do.				1	Tunnel do.		Red Ash,	West West Branch,	2	15	60		Do.	18,000	Do.	Milnes Haywood & Co.
Do.	1				1000 do.				1	Salem do.		Red Ash,	Young's Landing,	3	15	30	30	Do.	26,000	Near Pottsville;	Amurst & M'Durmut.

										Tunnel & Diamond,					1-15						
Jacob Serrill,			2				2 miles,		2	Blk Heath & Blk Valley,	6 to 8 ft		Wolf Creek,		‡			R. Road & Canal,	26,000	Do.	Gideon Bast
John Pinkerton,			1						4		4 to 21 ft	White Ash,	St. Clair,	1	25			Rail Road,	50,000	West of Millcreek;	Wetherill, Seitzinger & Co.
Thos. C. Williams,												White Ash,	Mount Laffy,							West Branch;	Refuses to give information.
John Rosser & Co.,												Grey Ash,	Oak Hill,								
Hooler & M'Cowen,		1							2		6 to 8 ft	Red Ash,	Oak Hill,	horse	break'r			Canal,		3½ m. S. W. of Pottsville;	Wetherill's
Jonathan Waaley,												Red Ash,	2¾ m. N. of Pottsville,							Wadesville;	Cumming, Bonsell & Co.
Fitzsimmons & Glenn,		1	1			130 yards,	80 yds.		2	Flowery Field,	3 to 6 ft	Red Ash,		horse	power,				20 to 25,000		Do
Daniel Edwards,												Grey Ash,									
Job Rich,												Red Ash,	York Farm,								Lee, Hart & Miners Bank
Charles Miller & Co.,	1	5	1	2	70 yards,		200 yds.		5	Diamond, Peach Mountain,	2 to 8 ft	Red Ash,	W. West Branch, near Minersville,	2	20	60		Rail Road,	40,000	Phœnix Colliery;	R. W. Packer
J. D. Steinberger,									2	Pott & Clarkson,	2 to 5 ft	Red Ash,	Milford,	1	20			Do.		Near Middleport;	Brooke, Rabb & Co.
Do.									2	Palmer & Spohn,	Do.	Red Ash,	Woodburn,	1	20			Do.		Do.	Wood, Dwey & Co.
Do.									2	Lewis & Yerd,	Do.	Red Ash,	Bushey,					Do.		Do.	Sellers, Davis & Co.
Rogers, Sinnickson & Co.	2		1	many	240 feet, 420 do.		80 yds.	1000 yds.	2	Lewis & Clarkson,	8 to 9 ft	Red Ash,	Near Pottsville,	3	20	70	35	Do.	50,000	N. American Mines;	N. American Coal Co.
Do.	2			3	350 feet, 150 yds.			1000 yds. 700 do. 800 do.	6	Pch Orchard, Blk Heath, Raven, Lother, Black Valley, & North veins,	5 to 25 ft	White Ash, Red Ash,	2 m. S. E. of Middleport,	3	20	60	60	Do.	50,000	New veins opening;	Spayd & Luther
M'Cormick & Clark,		1				600 yards,			1	Bonewitz,	3 to 4 ft	Grey Ash,	Near Donaldson,	1	10			Do.	new operation	Above water level;	Donaldson Coal Co.
H. Eckel,			1	3		100 to 600 yds			3	Tunnel veins,	4 to 7 ft	Red Ash,	Near Tremont,	1	12			Do.	20,000 tons,	Do	Do
Spanglor & Barndt,		2				250 to 550 do.			1		11 ft.	White Ash,	Donaldson,	1		20		Do.	25,000	Do	Donaldson Coal Co.
Milnes, Haywood & Co.,	1				400 feet,				1	Salem vein,	3 to 4½ ft	Red Ash,	West West Branch,	2	15	30		Canal,	18,000	7 m. above S. Haven;	James Cresson & Bro's.
Do.	1				350 do.				1	Tunnel do.		Red Ash,	West West Branch,	2	15	60		Do.	18,000	Do.	Milnes Haywood & Co.
Do.	1				1000 do.				1	Salem do.		Red Ash,	Young's Landing,	3	15	30		Do.	26,000	Near Pottsville;	Amurst & M'Dormut.
Do.	1		1		290 do.				1	Gate & Lewis,	3 to 7 ft	Red Ash,	Mill Creek Valley,	2	15	30	30	Do.	18,000	¼ m. from P. Carbon;	Wetherill & Seitzinger
Do.	1				500 do.				1	20 feet vein,	12 to 20 ft	White Ash,	Near St. Clair,	2	15	60		Do.	17,000	Pine Forest Colliery;	Wetherill, Seitzinger & Co.
Jas. H. Fitzsimmons,						sinking,			1	Diamond,	6 ft.	Red Ash,	Norwegian Township,					Rail Road,	new operation	New veins opening;	J. H. Fitzimmons, Lessig & Co
George Dougherty,		1				340 yards,			1	Jackson,	5 ft.	Grey Ash,	Tuscarora,	horse	power,			Do.	5,000	Above water level;	Alter & Struthers,
Rowe,		1				800 do.			1		4 ft.	Red Ash,	Near Tuscarora,	horse	power.			Do.	3,000	Do	C. Stephenson & Co.
Smith & Hodgson,		1				250 do.			1	Peach Mountain,	7 ft.	Red Ash,	Near Tuscarora,	horse	power,			Do.	6,000	Do	Do
Smith & Moss,		1				200 do.			1		5 ft.	Red Ash.	Near Tuscarora,	horse	power,			Do.	3 to 5,000	Do	Do
Reichert & Stapleton,		1				150 do.			1		8 ft.	Grey Ash,	Near Tuscarora,	horse	power,			Do.	new operation	Do	Alter & Struthers.
Oliver & Beecham,			2				1—180 yds. 1—250 do.		6		5 to 20 ft	White Ash,	Near Tuscarora,	1	20			Do.	30 to 40,000	Do	Samuel Bell,
Do.	1		1		80 yards.				2	Tuscarora & Greer,	5 to 12 ft	Red Ash,	Near Tuscarora,	2	20	60		Do.	20,000	Capacity increasing;	C. Stevenson & Co.
Charles Sillyman & Co.		3				1—650 yds. 1—320 do. 1—180 do.			6	Big, Black Heath, & Black Valley veins,	7 to 10 ft	White Ash,	Patterson,	1	20			R. Road & Canal,	25,000	¼ m. N. of Town;	S. Sillyman & Valley Furnace Co.
Forster & Butler,			1				400 yds.		3		5 ft.	Red Ash,	Dry Hollow,					Lehigh Canal, Carbon Co.	new operation	2¼ W. of Summit Hill;	Lehigh Coal & Nav. Co.
Jacob Werntz,		1				100 yards,			1		3 ft.	Grey Ash,	Near Donaldson,					Rail Road,	Do.	Above water level;	Swatara Coal Co.
Fosold & Ebert,			2						3	Salem, Gate & Black,		Red Ash,	Near Tremont,	1	15			Do.	Do.	Do	J. Hoffman, Esq., and others
Daly, Harlan, & Co.,		2				1100 do.			2	Peacock and Clinton,	4 to 7 ft	Red Ash,	St. Clair,	horse	power	break'r		Canal,	10,000	Do	Thomas Haven
Brock, Patterson & Co.,		1							1	Jugular,	50 to 60 ft	White Ash,	Ashland,					W. Branch R. Road,	new operation	13 m. N. W. of Pottsville;	Brock, Patterson & Hart
Do.		1				100 do.			1	Memmoth,	30 ft.	White Ash,	Ashland,					Do.	Do.	Do	Do
Do.		1				40 do.			1		6 ft.	White Ash,	Ashland,					Do.	Do.	Do	Do
Do.									1	Hart,	12 ft.	White Ash,	Ashland,					Do.	Do.	Do	Do
John D. Colt,		1				300 do.			1		5 ft.	Red Ash,	Donaldson,					Rail Road,	Do.		Donaldson Coal Co.
Colt, Gaskins & Lomison,		1				300 do.			1		10 ft.	White Ash,	Donaldson,					Do.	Do.		Do.
													Carbon County.								
Lehigh Coal & Navigation Company			1				900 feet,		1	Basin,	100 ft.	White Ash,	½ m. N. of Mauch Chunk,					Lehigh Canal,	new operation		Lehigh Coal & Navigation Co.
Packer & Douglass,			1						8	Do. †	50 ft.	White Ash,	Room Run,					Do.	65,000 tons,	5 m. from Mauch Chunk;	Do
Do.			1						5	Do. †	50 ft.	White Ash,	Room Run,					Do.	65,000	Do	Do
Daniel Bertsch,			2	2			627 feet, 850 feet,	775 yds. 570 do.	1	Do. †	11 to 53 ft	White Ash, Red Ash,	Panther Creek Valley,	2	1--20 1--20			Do.	40,000	Worked in Quarry;	Do
Lehigh Coal & Navigation Company			6						6	Do. †	5 to 55 ft	White Ash,	Summit Hill,	9	1—20 1—20 1—20 1—20 1—20 1—20	20		Do.	3 to 400 000	1 Stationary engine, 100 horse; 1 Do. 40 do.	Do
M'Lean & Leycon,	1		1	1	598 feet,		75 yards,	1682 yds.	1	Do. †	50 to 55 ft	White Ash,	Springdale,	2	15	30		Do.	45,000	Worked in open quarry;	Do
George H. Davis,			1				312 do.		5	Do. †	2 to 27 ft	White Ash,	Panther Creek Valley,	horse	power,			Do.	not shipping,	Capacity for 40,000 tons;	Do
Rodorick & Ryan,			1				363 do.		5	Do.	3 to 20 ft	Red & White Ash	Panther Creek Valley,	horse	power,			Do.	Do.	Do do	Do
Lehigh Coal & Navigation Company			2						6		5 to 40 ft	White Ash,	Room Run,	1	12			Do.	140,000 tons,	4 m. N. W. of Mauch Chunk;	Do
Spencer & Connor,			1				383 do.		1		7 ft.	Red Ash,	Panther Creek Valley,	horse	power,			Do.	not shipping,	Capacity for 40,000 tons,	Do
Leisenring & Nunamacher,			1				280 do.		3			Red & White Ash	Summit Hill,	horse	power,			Do.	Do.	Do do	Do
A. Pardee & Co.,	2				400 feet,				6		5 to 18 ft	White Ash,	Hazleton, Luzerne Co.	2		40	40	R. Road & Lehigh Canal,	120,000 tons,	Luzerne Co.	Hazleton R. Road & Coal Co.
Do.	1		1		sinking,				6		5 to 18 ft	White Ash,	1½ m. W. of Hazleton, do	1	‡	40		Do.	30 to 40,000	Do	Algernon & Edward Roberts
B. Meadow R. Road & Coal Com'y,	6				1 to 200 ys. ea.				6		5 to 30 ft	White Ash,	Beaver Meadow, do	7	10	2 of 30		Do.	100,000	Northampton Co.	B. M. R. Road & Coal Co:
Wm. Milnes & Co.,	2		1		1—50 feet, 1—80 y		450 feet,		6		5 to 27 ft	White Ash,	Summit, do	3	10	40	20	Do.	150,000	3 m. W. of B. Meadow;	Joseph Jeanes & Co.
Thos. Rodorick,	1		1		300 feet,				2		7 to 9 ft	White Ash,	Buck Mountain, do	horse	power,			Do.	50,000	9 m. E. of Hazleton;	Buck Mountain R. R. & Coal Co
——		3				800 do.			1	Diamond vein,	3 to 6 ft		Silver Creek, Schuylkill Co.	1	12			Canal,	35,000	Near New Philadelphia;	John Alspach
George Spencer & Co.,	1		1		390 feet,		80 yards,		2	Do.	8 ft.	Red Ash,	Near Minersville, do	2	15	40		Rail Road,	20,000	Minersville Tract;	Joseph Jeanes
Harvey Steese & Co.,				1				1000 yds.	1	Lorbery vein,	20 ft.	Red Ash,	Lorbery Creek, do					Union Canal,	11,000	Above water level;	Swatara Coal Co.
J. & R. Carter,									2	Mine Hill veins,	10 to 12 ft	White Ash,	Near Tamequa, Sc'lkill Co.	1	15			Rail Road,	31,344	Do	Little Schuylkill R. R. Co.
Heaton & Carter,													Do.					Do.	24,282		
Harlan & Henderson,													Do.					Do.	16,901		
Robert Radcliff & Co.,													Do.					Do.	13,512		
James Tangart,													Do.					Do.	9,488		
William Donaldson,													Do.					Do.	9,265		
Hendrick, Jones & Berwick,													Do.					Do.	802	New operation;	
John Anderson & Co.,													Do.					Do.	807	Do.	
M. G. & P. Heilner,	1												Wolf Creek,					Do.	10,000	Near Minersville;	A. F. Miller & Co.
William Payne,			1				1½ mile,		3	Daniel, North & Juggular,	6 to 20 ft	White Ash,	Heckersville,	3	20	60	30	Do.	64,273	W. of Coal Castle;	Forest Improvement Co.
Joseph G. Lawton,	2	2	1	4	150 ft. each.	½ mile,	150 yards,	each ½ mile,	1	Mammoth or Daniel,	17 ft.	White Ash,	Mill Creek,	2	20	12		R. Road & Canal,	46,573	1 m. above St. Clair;	Pott, Bannan, Lawton & Co.
Charles M. Hill,													Mine Hill Gap,					Do.	36,091		
W. & T. Johns,													Mine Hill Gap,					Do.	29,523		
Joseph G. Lawton,				4				2 miles in all,	2	Primrose and Orchard,	4½ ft.	Red & Grey Ash	Mill Creek,	2	20	30		Do.	22,496	St. Clair;	Carey & Hart
Thomas F. Ash,	1				170 yards.														15,927		
A. Hoebner & Sons,																			13,374		
R. Kear,														1	10				11,287	Refuses to give any information.	
James Peuman,																			11,286		
Jones & Evans,																			8,903		
James Barry,																			7,980		
A. A. Clarkson,																			7,951		
H. Guiterman & Co.																			6,846		
M. G. & P. Heilner,	1				120 yds.				3	Black Valley, &c.	4 to 9 ft	White Ash,	Wolf Creek,	2	15	60		Rail Road,		Near Minersville;	Brock, Hammer & Co.
Do.	1			1	900 feet,			900 yards,	1	Basin vein,	8 ft.	White Ash,	Wolf Creek,	1	15			Do.	40,000	Do. do.	Joseph Jeanes
Do.									3	Faust, Little Rabbit,	4 to 9 ft	Red Ash,	Llewellyn,	1	15			Do.		At do.	A. F. Miller & Co.
Lewis C. Dougherty,													Coal Castle,								Dundas & others.

† In addition to the veins numbered.

‡ Breaking and Hoisting Engine.

COAL-BEDS.—Heath's mine in Virginia, is represented to contain a coal bed fifty feet in thickness ; a coal bed near Wilkesbarre, Pa., is said to be twenty-five feet thick ; at Mauch Chunk is a coal bed forty to fifty feet deep, and in the basin of the Schuylkill are fifty alternate seams of coal, twenty-five of which are more than three feet in thickness. In Nova Scotia is a coal formation fourteen hundred feet deep, and containing seventy-five alternate layers of coal. The Whitehaven coal mine in England, has been worked twelve hundred feet deep, and extends a mile under the sea, and the Newcastle coal mine in the same country has been worked to the depth of fifteen hundred feet, and bored to a similar additional depth without finding the bottom of the coal measure.

THE national armory in Springfield, Mass., made, in the month of June, 25,000 rifled muskets.

WONDERFUL GROWTH OF COMMERCE.—In 1784 an American vessel entered Liverpool, with *eight bales of cotton* as part of her cargo. This was seized by the Customs on the conviction that it could not be American growth.—In 1857, *a million and a half bales of cotton* were imported at Liverpool from the United States. The first steam engine used at Manchester was not erected till 1790. It is now computed that in that city, and the district within a radius of ten miles, there are more than 50,000 boilers, giving a total power of upwards of 10,000,000 horses. The engine of Watt has proved the very Hercules of modern mythology ; the united steam power of Great Britain being equal, it is estimated, to the manual labor of 400,000,000 of men, or more than double the number of males supposed to inhabit the globe.

LACKAWANNA COUNTY LIBRARY SYSTEM
5 0686 01066328 9